November

RADIO AND HOBBIES IN AUSTRALIA

VOL. 1, No. 8

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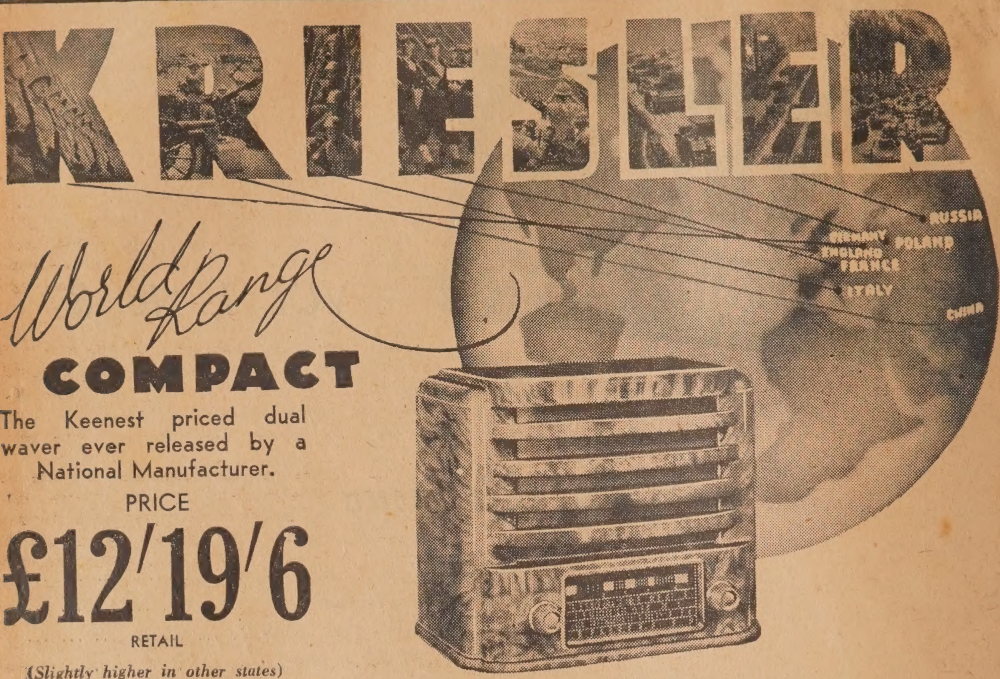
A "WIRELESS WEEKLY" PUBLICATION



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With the Editors

THE AMATEURS

One of the most regrettable necessities which have been forced upon us by war conditions, has been the suspension of amateur transmitting licences for an indefinite period. All amateurs realised that, should war ever transpire, their activities must naturally cease forthwith. The Government has enough worries among other things, without having added to them the possibility of unauthorised transmissions taking place under the shield of amateur activity.

The amateurs in Australia have accepted this sad state of affairs with remarkable sportsmanship. Every amateur with whom we have come into contact has treated the matter in absolutely the right spirit. Most of them regret only this—that their status as an amateur is, at the moment, of little value to the country other than something that they have on their side in case of emergency.

We also join in this regret, that it has not been possible to make use of the amateur, his knowledge and his terrific enthusiasm, in some scheme which would fit in with the nation's defences. Not all amateurs have reached a standard of efficiency which could be employed in some such scheme. There are the beginners, the proficient and the not so proficient. But we know personally many who would be capable of fitting very well into, for instance, an emergency network, silent until needed, but of considerable value should the occasion arise.

Naturally, of course, we do not mean our remarks to be taken as criticism of those in charge of these things. We are simply expressing what many others must have thought, that the possible dispersal of more than 2000 amateur transmitters seems to be rather a pity. Sooner or later, as the war goes on, most of these will divert their enthusiasm into other channels. At least the powers that be should know that every amateur in the length and breadth of the land would be willing to play his part, with an earnestness never dreamed of when radio to him was a hobby and nothing more.

May we in passing, express our admiration for the Wireless Institute of Australia, in the efforts it is making to keep the spirit of the amateur alive in spite of everything. We sincerely hope that, when the end of the war has come—and may this be soon—their efforts of the present will be repaid.

Meanwhile, there are plenty of things the amateur can do to increase his knowledge of radio, and to maintain his interest in it. He should remember first of all, that he has a big start on others in this matter of radio operating. He has now an opportunity to reinforce this knowledge by excursions into aspects of radio which so far he has not explored. Amplifier systems, short wave receivers for general use, standard broadcast receivers, and special equipment—his interests to date no doubt have taken little notice of these.

And as for Morse code proficiency, here is the time and the opportunity to bring it up to a high pitch. Should radio operators be required, and no doubt they will be, what a help to present oneself as a man fully qualified to pass any commercial test!

There is just one other point worth mentioning. When the war is over, no doubt the status of the amateur will once more come under the consideration of the authorities. If the 2000 amateurs on the list desire that they shall continue to be there, or that there will be a list at all in which to be included, they should remember the old saying, "Unity is Strength." This is the very time to show their loyalty to the amateur movement by maintaining their closest touch with it. The best way for the amateurs to make quite certain of losing the air for ever, is to adopt a pessimistic attitude, and throw in the sponge. If you want your little bit of the ether when its all over, do something to show you want it, and you'll get it. If you want it hard enough, the battle is half won!

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ANTI-NAZI STATION GRIM REALITY!

Mr. L. B. GRAHAM

Says LANCE GRAHAM

EUROPE DOES WANT PEACE

The existence of an Anti-Nazi Transmitter in Germany, so long the subject of speculation as to ways and means of its operation, is vouched for by Mr. L. B. Graham, Principal of the Australian Radio College, who recently returned from a visit to England and the Continent.

Mr. Graham relates how he discussed the activities of the transmitter, and its operators, with a Norwegian in Germany, and was told by this man how the station is reported to operate.

"This man appeared to be in some way connected with the organisation which operates the transmitters," said Mr. Graham, "and I was able to persuade him to tell me something about it.

"The transmitters, I am told, are operated in vans, so that they can move quickly from place to place. This is, of course, necessary, if they are to continue in operation without being detected.

"At night, one of these vans, which, to all appearances, might be a meat van, shall we say, starts off with a crew of about a dozen men. It drives to the selected spot for the broadcast, and, immediately, most of its crew scatter in all directions, to do their work as scouts.

"Soon, the telescopic aerial is raised into position, and the broadcast commences. Usually, it is carried out without interruption, and, in such a case, would afterwards drive away in a normal manner.

"If one of the scouts sees anything he thinks to be suspicious, he immediately doubles back to the van, and operations are ceased. The other scouts are allowed to look after themselves, and eventually make their way back home."

The members of the party which operates these transmitters, Mr. Graham was told, are fervent patriots, and regard detection and death as a risk they must take in the cause. There are dozens of such vehicles prepared for use, and the transmitters used are very compact, and well hidden in the construction of the van.

STATION HEARD IN AUSTRALIA

Mr. Graham's experience is made still more interesting by the fact that our short-wave correspondent, Mr. Ray Simpson, reports having heard the station broadcasting from Germany on several occasions in the last week or two.

The wavelength and matter broadcast check up perfectly with reports of anti-Nazi broadcasts which have appeared in the Press.

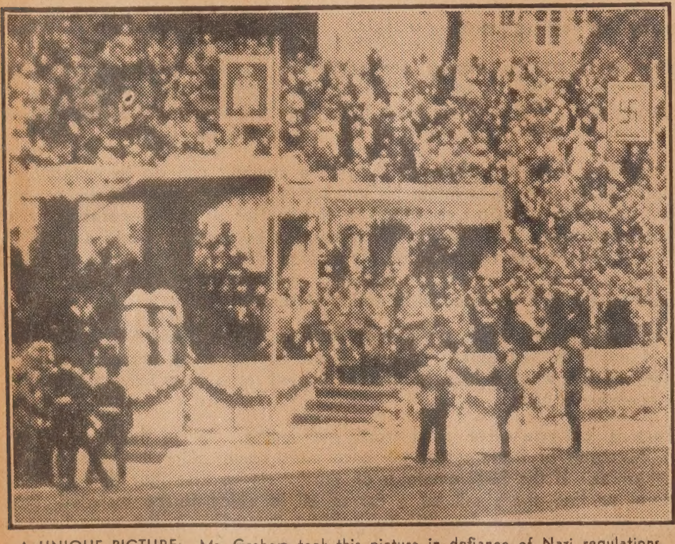
GERMANY AND PEACE

Although our interview with Mr. Graham was primarily intended to deal with radio, he had so much interesting matter to talk about in view of the present situation, that most of our time was taken up in talking about it.

Mr. Graham and his wife must have been among the last foreigners to travel through Germany before the war, as they were on their way home to Australia when the declaration was made.

Consequently, Mr. Graham's impressions of Germany and other European countries was of special interest.

"The German people do not want to fight," said Mr. Graham, "and above all,



A UNIQUE PICTURE: Mr. Graham took this picture in defiance of Nazi regulations, with a small camera, raised over his head. The original measured 3in. x 2in., and the full length of the platform shown here was about half-an-inch! Fortunately the film was a particularly good one, so we got our enlarger to work. By magnifying the picture to an equivalent size of 30in. x 40in. we got this result. Immediately above the man in the roadway in the centre of the picture, is Hitler. Facing him is Prince Paul of Yugoslavia. At the extreme left of the second row is the burly Goering. None of these were distinguishable in the original print.

GERMANY

German guards goose-step into position outside the Foreign Office in Berlin. The changing of the guard is quite an event for the populace.

to fight with Britain. The idea of such a war was discounted just as much by the average German, as it was in Britain itself. No one thought that the two countries would ever fight again.

"Most Germans were amazed when they knew that Hitler had marched into Prague, after the Czechoslovakian problem had been settled. It was one of those things which the Feuhrer had done, and, therefore, it was best not to say too much about it.

"It is the leaders and the army which do things. The average German accepts them because it is the safest thing to do. As long as he has peace, and food, and work, he is prepared to accept anything which he thinks will give Germany a fair chance.

"With the army it is different. The first thing I heard on entering Germany the first time was a whispered chuckle from a Storm-Trooper, in broken English, 'The Feuhrer is in Prague!' To such men, Hitler is everything.

"And yet the most popular of Germany's leaders is Goering. He can always command a cheer as his big warplanes thunder over the streets—hundreds of them, almost touching the buildings. He accepts such cheers with a confident wave of the hand, and a full knowledge of his own power.

"The most hated of these leaders is Goebbels, who is almost without a friend. The logical successor to Hitler, the people believe, is Himmler. Rudolph Hess most of them do not know. He is more of a name.

SUBSTITUTES

"Germany is filled with substitutes. Clothing I bought in Germany was almost unfit for wear. A pair of flannel trousers stood up until the first wash. A suit I bought with the last few marks I had left, I could not wear—it was made of straw. The man who sold it to me told me it would be no good! It wasn't."

PERMANENT
TRENCHES
FOR
CITY of WESTMINSTER

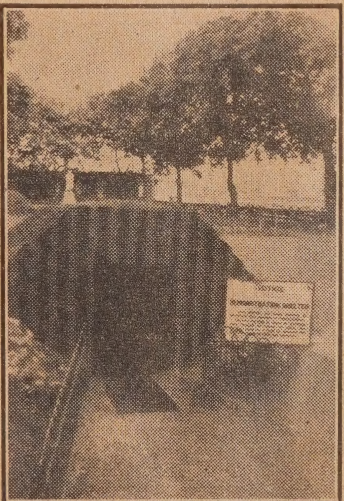
ENGLAND

"In England now!" This is one of the notices which have sprung up in London since the war.

FRANCE DETERMINED

"The French people exhibit no positive hatred of the Germans, but they are determined that never again will their lands be ravaged by them. They have been working since 1918 to prevent it. They are determined that if and when Germany starts something, they will be ready.

ENGLAND



One of the permanent air-raid shelters in England gives mute evidence of England's prepartions for war!

HOLLAND

Happy, peace-loving Dutch folk face the camera, and the future. Who knows what their lot may be?

"Australians are almost mobbed in the old war zones. It is often hard to pay for drinks when once the people know you are Australian.

"Strange to say, the Germans knew more of Australia than the English. The latter still had the old idea that Australia was wild and woolly—Jack Lang's escapades still leave many of them with the impression that Australia is a bankrupt country!

IN HOLLAND

"The Dutch are not lovers of the Germans and will have nothing to do with their Nazi propaganda. They have taken elaborate precautions to resist any possible invasion of their territory.

"In one area I was not allowed to smoke because, I was told, the trees round me were all charged with dynamite, and a spark might set it off! Even cars are not allowed to pass unless one of them is stationary.

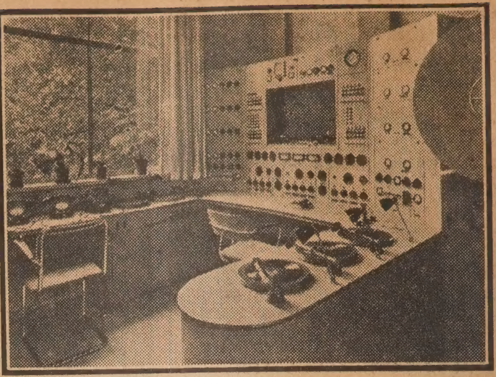
BELGIUM

"The Belgians are pitifully broken-spirited, still suffering from the aftermath of the last war. They cannot see how their country is to remain safe should hostilities commence in earnest.

"One cannot blame them. Everywhere, you can see reminders of their terrible ordeal of 25 years ago. Even beautiful buildings, with their panelled walls full of holes where German soldiers had driven nails. And all the country's bronze monuments are gone—taken when metal was so valuable.

"The Swiss also have their misgivings

How they build studios in Europe. This interesting studio is used by la Societe Romande de Radiodiffusion.



The elaborate control room seen at Hilversum. As will be seen it combines pleasant surroundings with efficiency.

about Germany. They see their danger and have prepared as best they may to defend themselves should this be required.

ENGLAND PREPARED

"England is like an armed camp," said Mr. Graham. "Air-raid shelters are everywhere. Signs are on all sides to tell the people the quickest way to them. The big stores all feature such signs. The organisation behind war precautionary methods is staggering. Where once there was a shortage of fire-engines, for instance, now there are apparently far more than one could imagine being required. In one place, where once there were three engines, now there are 80, and the local brigade is distracted to know what to do with them! England has made an effort which even her people must surely have thought impossible.

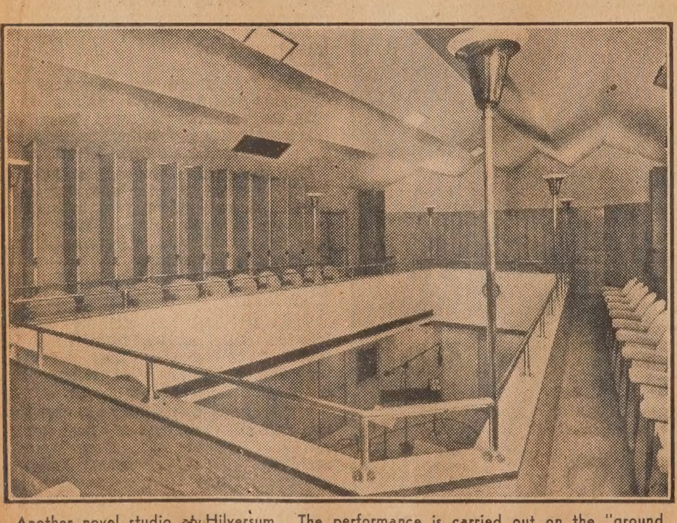
"And the people are determined and philosophical about it all. There is nothing else to be done—they know it, and so they just carry on as best they can.

RADIO IN ENGLAND

"Radio in England is very active," continued Mr. Graham, "but prices are so keen, and competition so intense, that there is not much profit to be made at present. Everywhere one sees tiny American Midget sets listed at 79/6 for a five-valve set—not much encouragement to the trade, however one looks at things. The English sets are good, having good tone, and adequate sensitivity and selectivity. Not as good as Australian sets, however, except possibly for their tone.

RADIO IN EUROPE

"In Europe, things are brighter. Here again, Germany is an interesting place. The most popular sets are the big ones—eight-valve all-wave radio receivers on which the people tune in their overseas programmes with avidity. Moscow is particularly strong.



Another novel studio at Hilversum. The performance is carried out on the "ground floor." Note the specially constructed walls and ceiling which prevent undesirable reverberation.

"The 'People's Set' is more of a joke than anything else. It is quite a good one in its way, but it is generally found in an out-of-the-way corner, where the dealer hopes no one will see it. There is no profit in it, and, of course, its results are very limited.

"One thing is most noticeable," continued Mr. Graham, "when watching the innumerable parades of mechanised forces in Germany.

"That is the universal use of radio equipment. As each unit passed down the street, it could be seen that each was fitted with an aerial, and radio equipment.

"Whether each carried a transmitter as well as a receiver, of course it was impossible to say. But even motor cycles and push-bikes appeared to have some form of radio as part of the equipment.

"It is only logical that this should be so, of course, and no doubt it is characteristic of every modern army in Europe. Things move so quickly as we have already seen in this war, that communication is just as important as anything else, and more important than most."

WIRED WIRELESS

"Radio programmes over the wire are very popular in Europe, and in England they are also in evidence. Several programmes are sent over by the carrier system, and are selected at will in the home.

"Switzerland is very well served by this system, and it has proved to be very efficient. The programmes generally are very good, and are well prepared.

TELEVISION IN ENGLAND

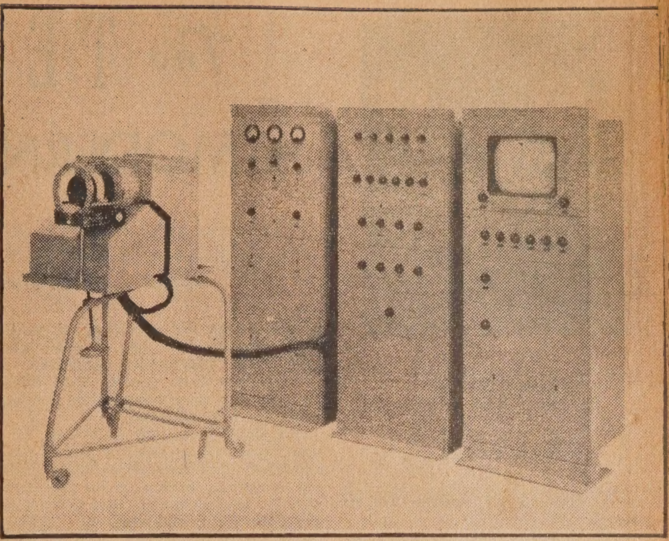
"Television in England continues to make what I would call slow progress. The dealers are not very keen on selling the sets—at £35 for the cheapest good set, they think the price is too high.

"However, the service as such is thoroughly satisfactory, and I was most impressed with the results which have been possible.

"I saw very good low-powered transmitter which can be purchased for about £15,000, and these are capable of a good 25-mile service under good conditions.

"I am not particularly interested in advocating television at present for Australia, but I do think it a great pity that something cannot be done to make a start over here. There is little doubt that television is destined to play an important part in the entertainment and instruction of people as a whole.

"Yes, I am glad to be back in Australia. It is quite true that the more one sees of foreign countries, the more one realises what a grand place Australia is to live in. To enter a British country is to sense a difference in everybody and everything. Believe me, Australia is a land worth fighting for!"



The sight and vision equipment of a television transmitter which can be purchased for £15,000.

AMATEURS MAY KEEP THEIR CALL SIGNS

★ Morse Training Progresses ★

By W. G. RYAN

Saturday, September 2, 1939—a date that will live long in the minds of Australian Experimenters and Amateur Transmitters—now seems a very long time ago. Amateur Transmitters are now reconciled to the fact that they must seek pastures new for their experiments and no longer can the merits and demerits of our respective Transmitters, Amplifiers and Receivers be discussed at leisure over the air.

Nevertheless these discussions still take place and wherever you see two "hams" the subject now is not how much R.F. one can put into an antennae but the Frequency response of Amplifiers or the quality of some of the Overseas Shortwave Broadcasting Stations.

The New South Wales Division of the Wireless Institute of Australia has undertaken a survey in order to find out the number of amateurs serving in the Communications Sections of the various Defence Arms, and in New South Wales alone it is estimated that there are at least two hundred experimental transmitters doing their part in the country's defence.

The offer of the Institute to train a body of Telegraphists has been accepted by the Defence Department, and Brigadier Street has warmly commended the division on its action.

The Morse training classes will commence at the Y.M.C.A. Buildings, Pitt-street, Sydney, on Tuesday, October 24, and all those desirous of taking advantage of this course are asked to get in touch with the secretary, W.I.A., New South Wales Division, Box 1734 JJ, G.P.O., Sydney, as soon as possible as the classes are rapidly filling.

There is no charge, and the only qualification necessary is willingness to serve in a Signal Section if called upon.

At the moment the R.A.A.F.W.R. has sufficient operators, but anyone desirous of joining the Air Force Wireless Reserve should interview Aircraftsman Hines, VK2QL, at R.A.A.F. Recruiting Depot, Ultimo, who will take all particulars and advise of any vacancies.

The Volunteer Coastal Patrol has several vacancies for signalmen and anyone interested should get in touch with Communications Director Lusby at MA6321 or 10 Leeton-avenue, Coogee.

SEPTEMBER MEETING

The September meeting of the institute was marked by the enthusiasm shown by members and the desire to carry on as usual. It was decided that no separate meeting would be held by the Ultra High Frequency Section, but that a certain period be set aside for the discussion of U.H.F. doings at each monthly general meeting. Mr. Ross Treharne, VK2IQ, has been appointed to look after this section, Mr. Don B. Knock, who had occupied the presidential chair, now being busy with military duties.

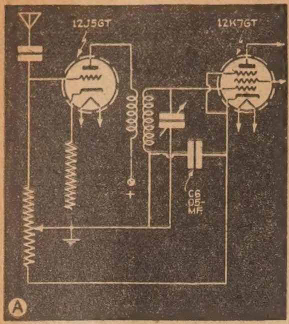
CALL SIGNS RESERVED

Immediately the notice had been received suspending amateur transmissions, the institute took up the matter of retention of call signs with the Postmaster-General's Department, Wireless Branch, and the Chief Radio Inspector has advised that the "call signs at present held by experimenters will be reserved for them when licences are again issued." This decision should gladden the hearts of quite a number of "hams."

Results of the British Empire Radio Union's Annual Dx Contest are now to hand and won by K. Rudkin, VK2DG. Speaking of Dx, it was quite pleasing to see such well-known figures in the contest side of the hobby as 2LZ, 2ADE, 2HZ and 2VN, in the uniform of the Air Force.

It may be truly said of the men as well as many others that they are making their hobby serve their country and it is quite certain that many things learnt in pursuit of the elusive Dx are now being put to good use. The words of Lieutenant Tulsa, who was in charge of training U.S.A. operators in the last war, may be well remembered. "The first man we looked for was a 'ham'!"

The TECHNICAL


12J5GT
12K7GT
C6
.05-
MF.
A

INTERESTING SET FEATURE

(1) CONTROLLED REGENERATION USED

Emerson Model CU-265. *Regeneration, which at no time can produce oscillation but vary from maximum at minimum volume to minimum at maximum volume, is used in this T.R.F. set to greatly improve its selectivity and sensitivity.*

Compensation for only two tuned circuits in this receiver is greatly affected through the use of controlled regeneration.

A loop is wired in series with the first grid-tuned circuit and the R.F. voltage drop across it due to signal current flow at resonance is coupled to the cathode of the 12K7GT through C6. This differs from the cathode-tap method of feedback only in being a *shunt-coupled* instead of a *series* circuit. The additional advantage of shunt-coupling is provided by permitting the antenna-bias method of volume control in this same tube.

Little or no regeneration for selective purposes is needed for distant stations of weak signal strength and the maximum sensitivity of the set is adequate. However, for strong stations regeneration is valuable for greatly improved selectivity and so as the volume is reduced to minimum for powerful signals, regeneration is increased by reason of the high resistance from cathode to ground.

Televising

16 m.m. Film

Reports indicate that the R.C.A. is experimenting with 16 millimeter film for television, in place of the 35 millimeter film used at present.

It is pointed out that 16 m.m. film is cheaper to use, the smaller quantity reduces fire hazard, and design is simplified. It will also allow special cameras and films of an improved type to be made specially for television.

A MODERN 6v. T.R.F. SET

Even in U.S.A. the T.R.F. set comes in for attention now and then. This circuit is interesting from several angles, including the three R.F. stages and A.V.C. circuit.

NO tricks are incorporated in this receiver—it's just a straightforward *tuned-radio-frequency* job having tone quality that worked rings around more complicated sets with which it was compared.

Although primarily intended as a good local-station receiver, it has ample sensitivity and selectivity for all ordinary needs, by reason of its four tuned circuits, iron-core coils, and three stages of high-gain amplification. Modern metal tubes permit its efficient circuit arrangements to be employed.

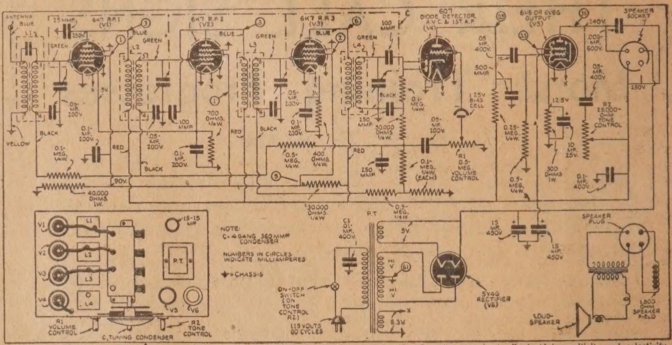
CIRCUIT

This receiver has been designed for the high-fidelity-seeking experimenter and serviceman, willing to forego short-wave features, consigned to the superheterodyne circuit. Four tuned circuits, utilising Ferrocart (iron-core) coils, provide the maximum sensitivity and selectivity per stage.

Three metal 6K7 screen-grid tubes are used as R.F. amplifiers with A.V.C. voltage supplied by the diode detector section of the 6Q7. The triode section of the 6Q7 is resistance-capacity coupled to the 6V6 metal beam output tube, delivering more than three watts. The 5Y4G is a "glass octal" rectifier tube.

There are three controls, viz., tuning, volume and tone. The aeroplane-type illuminated dial is calibrated in kilocycles, making it easy to tune-in the stations.

Using the volume control in the first audio stage, instead of any of the R.F. stages, permits the proper R.F. loading of the diode detector circuit, resulting in better tone quality. Although the author prefers to omit tone compensation or control, some experimenters desire this feature which enables them to adjust the attenuation of the "highs" to suit their individual requirements. It should be noted that the on-off switch is an integral part of the tone control. This permits a relatively permanent setting of the volume control, which is not disturbed by the turning on or off of the receiver.


ANTENNA
BLUE
L1
25 MMF.
250V.
6K7 R.F.1
(V1)
GREEN
BLUE
L2
6K7 R.F.2
(V2)
6K7 R.F.3
(V3)
L3
L4
C
6Q7
DIODE DETECTOR
A.V.C. & 1ST A.F.
(V4)
6V6 OR 6V6G
OUTPUT
(V5)
SPEAKER SOCKET
240V.
.008-
MF.
600V.
250V.
100 MMF.
YELLOW
BLACK
RED
5V.
3V.
.05-
MF.
200V.
0.1-
MF.
200V.
0.1-
MEG.
1/4W.
700
OHMS.
1/4W.
90V.
40,000
OHMS.
1W.
0.5-
MEG.
1/4W.
400
OHMS.
1/4W.
30,000
OHMS.
1/4W.
250
MMF.
50,000
OHMS
1/4W.
1.25V
BIAS
CELL
0.1-
MEG.
1/4W.
(EACH)
R1
0.5-
MEG
VOLUME
CONTROL
.05
MF.
400V.
500
MMF.
0.25-
MEG.
1/4W.
12.5V
10
MF.
25V.
300
OHMS
1W
R2
25,000-
OHM
TONE
CONTROL
0.1-
MF.
400V.
15
MF.
450V.
SPEAKER
PLUG
LOUD-
SPEAKER
1,800
OHM
SPEAKER
FIELD
5Y4G
RECTIFIER
(V6)
HI.
V
6.3V.
P.T
C1
.01-
MF.
400V.
ON-OFF
SWITCH
(ON
TONE
CONTROL
R2)
115 VOLTS
60 CYCLES
NOTE:
C - 4 GANG 360 MMF
CONDENSER
NUMBERS IN CIRCLES
INDICATE MILLIAMPERES
= CHASSIS
V1
V2
V3
V4
V5
V6
15-15
MF
P.T.
R1
VOLUME
CONTROL
C, TUNING CONDENSER
R2
TONE
CONTROL
①
②
③
⑤
⑥
⑮
㉟
㊱
(61)

Complete schematic diagram of the 6-tube T.R.F. broadcast set. The use of iron-core R.F. and I.F. coils throughout affords high sensitivity and selectivity.

The circuit and layout of the T.R.F. set. If four-gang condensers can be procured it would be quite possible to duplicate it here.

Simplicity of filament wiring is facilitated by the grounding of one filament terminal on each of the 6.3-volt tubes and the grounding of one side of the 6.3-volt winding on the transformer.

The receiver chassis is relatively small (10 x 12 x 3 ins. high) enabling it to be mounted into a small or large console. To secure the full frequency response made possible by the dynamic speaker, the experimenter should provide proper speaker baffling. Should the cabinet reverberate at certain frequencies, the use of celotex slabs on the inside of the cabinet will absorb or break up those sympathetic frequencies and eliminate the difficulty.

—"Radio-Craft."

EDITOR'S WORLD REVIEW

Developments in other lands

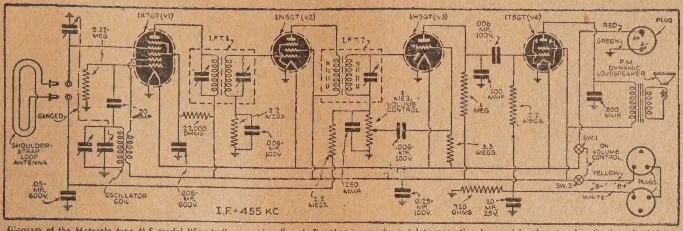

1A7GT(V1)
1N5GT(V2)
1H5GT(V3)
1T5GT(V4)
0.22-MEG
I.F.T.1
I.F.T.2
.50 MMF
22,000 OHMS
2.2 MEGS
.006-MF. 100V
GANGED
SHOULDER-STRAP LOOP ANTENNA
.05-MF. 600V.
OSCILLATOR COIL
.006-MF. 600V.
I.F.=455 KC
2.2 MEGS.
250 MMF
1 MEG. VOLUME CONTROL
.006-MF. 100V.
.006-MF. 100V.
100 MMF
1 MEG
3.3 MEGS.
2.2 MEGS.
0.25-MF. 100V.
720 OHMS
20-MF. 25V.
PLUG
RED
GREEN
A+
A-
P.M. DYNAMIC LOUDSPEAKER
800 MMF
SW.1
ON VOLUME CONTROL
YELLOW
SW.2
"B-"
"B+"
WHITE
PLUGS

Diagram of the Motorola type 41-S model "Sporter" personal radio set. The chassis may be put into operation for servicing by plugging the loop back into place. Frequency range is 540 to 1,560 kc. Uses General batteries Nos. 2F1 ("A"), 20AAA9, and 34AAA9 (latter 2 for "B").

AN ULTRA-PORTABLE RECEIVER

Some small portable sets have appeared in Australia, but none as small as this little job from U.S.A. The only snag is a battery life of about 50 hours!

ONE of the latest portable receivers to make its appearance on the market is the Motorola type 41-S "Sporter" model.

By utilising all the advances that have been made in vacuum tube and other components, and in applying them in a superheterodyne circuit, it has been possible to produce, in the 41-S, a portable that weighs, complete with batteries and permanent-magnet dynamic loudspeaker, only 6¼lb., in a case which measures only 4 x 5¾ x 9 ins. high.

SHOULDER-STRAP LOOP ANTENNA

The requisite loop antenna has been utilised as the shoulder strap! It may be interesting to note that this new type of loop (patent pending) is provided with two prongs, which are sufficiently long to extend through the bottom of the casing and into the receiver chassis.

The leather strap which serves as the hinge for the underneath cover is provided with snap fasteners which also serve to hold this loop in place. A unique fact is that the shoulder-strap antenna, which is ordinarily worn diagonally, as illustrated, exhibits but slight directional effect.

CIRCUIT

As is shown by the schematic circuit of this four-tube portable, the actual circuit is quite standard. The secret of how this radio set performs so well is found in the use of high efficiency iron-core I.F. transformers, the loop antenna of comparatively large dimensions, precise values of resistors and condensers, and the use of high-gain tubes.

By thus giving special attention to every factor in the design of this portable, it has been possible to obtain an extremely sensitive and selective chassis with good audio output with a plate voltage of only 82 V.

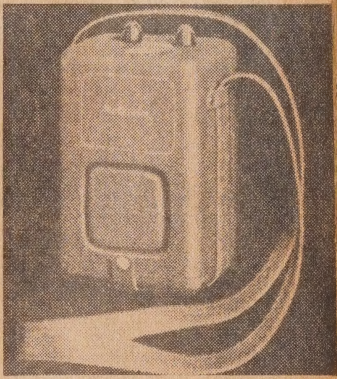
The "C" bias for the beam power tube is obtained as the drop across a 720-ohm resistor in the "B minus" lead. This circuit arrangement necessitates a ganged switch with one section in the "A plus" lead and the other in the "B plus" lead. This two-gang switch is mounted on the volume control.

The diode section of V3 also delivers A.V.C. voltage to the first two tubes. The triode section of V3 operates as a first A.F. or driver of V4.

One important factor in making possible the small-space feature of this receiver is the series of Bantam-type tube Four of these new small tubes are use

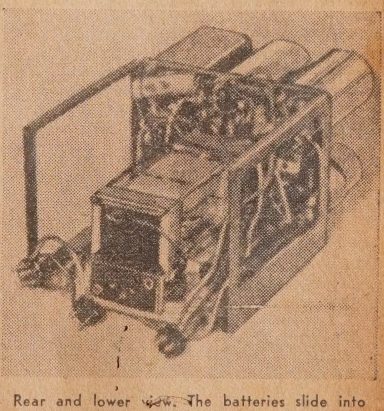
Special batteries had to be designe to fit the limited available space, i order to secure 82 V. of "B" voltage. Thi voltage is derived as the total of th "A" supply of 1.5 V., and the "B" batter of 80.5 V. (A 45 V. and a 35.5 V. "B battery, in series.)

A set of batteries should provide 5 to 75 hours of life, depending upo the type of service in which it is used that is, whether the portable is used fo periods of time, or whether it is use for really short periods, with plenty o time in between for the batteries t recuperate.



Close-up of the Motorola "Sporter."

Front and top view of the "Sporter" chassis.



Rear and lower view. The batteries slide into place. Note terminal plate for the plug-in loop.

EXPERIMENTAL

John Logie Baird addressing the World Radio Convention held in Sydney last year.

When Baird was in Sydney last year he was stung by some pessimistic remarks into stating that eventually television would be in full natural colors, and in full stereoscopic relief. This article which appeared in the English Wireless World, tells of his latest activities to make his dream come true.

ON July 27 a very great advance in television technique was demonstrated by Mr. J. L. Baird at his laboratories in Sydenham. Here or the first time was shown television n natural colors, using at the receiver cathode-ray tube.

The apparatus used by Mr. Baird is f a totally different type from that emloyed by the B.B.C. and at present can only be considered as a very successful xperiment which may in the near uture be used for cine-television, but which will certainly not be introduced nto the normal television service for many years.

NOT NEW

Before dealing with the apparatus in question it may be of interest to readers o review some of the other demonstrations of color television that have been given by Mr. Baird and see the manner n which the present apparatus has been evolved.

It will come as a shock to many readers to learn that color television was first demonstrated as early as 1928, when Mr. Baird showed the transmission and reception of simple television images in color to members of the British Association at the annual meeting held in Glasgow.

The fact that this experiment made use of a line instead of wireless for the transmission channel does not detract in any way from the greatness of the achievement.

The apparatus employed consisted of a modified form of scanning-disc type spotlight scanner at the transmitting end in conjunction with similar gear at the receiving end.

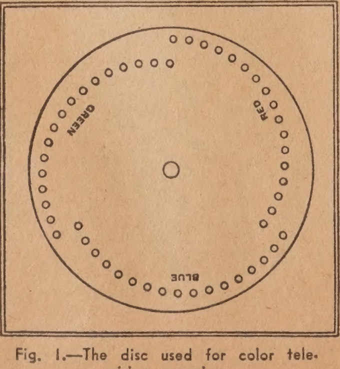


Fig. 1.—The disc used for color television scanning.

The difference between the then conventional spotlight scanning system and the one here described is that instead of the disc having only one set of scanning apertures arranged in spiral formation, it had three sets, one set being covered with a red, another with a blue and the third with a green filter. Fig. 1 shows this disc, and it can be seen from this that the object was scanned three times in one revolution of the disc, each time with a different color, so that the object was scanned first by a red spot, then by a blue and then a green.

In this manner three images were obtained corresponding to the red, blue and green components of the picture.

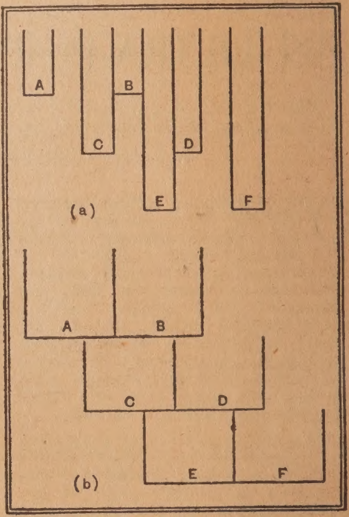


Fig. 2.—New arrangement of scanning system described in the feat.

At the receiving end a similar disc was arranged to revolve in synchronism with the transmitting disc.

Behind the disc were arranged glow discharge lamps, modulated by the incoming signal from the transmitter.

Since at the transmitter an image representing the red, blue and green components of the scanned object were transmitted in order, then, at the receiver, since these images were viewed through similar filters in the same order and speed, then the viewer saw a picture in a combination of the three primary colors from which, as is generally known, most colors and color tones may be obtained.

The picture so obtained was, of course, exceedingly small, about two inches square, and owing to the low period of scanning suffered from a marked flicker, but, nevertheless, it constituted a noteworthy step in the right direction.

TELEVISION IN NATURAL COLORS

In February, 1938, ten years after the experiment described above, a demonstration of color television was given at the Dominion Theatre. Again a mechanical system was employed, but of a greatly modified form.

A new system of scanning also was used, and this is of sufficient interest to spend a little time in describing it. Interesting not only because it was employed in the apparatus to be described, but also because in the opinion of several people this form of scanning has great possibilities for the future.

MULTI-MESH SCANNING

The multi-mesh system of scanning is not entirely new; in fact, it was being used by Mr. Baird in his very early experiments as far back as 1923, but was not carried on with, since the scanning gear became too complicated to merit its use in a television apparatus of the very low definition then employed.

With advances in technique that have been made in latter years, it has become possible once more to turn to this form of scanning and make use of its many advantages over the normal straight and interlaced systems.

The system of scanning is such that a secondary field is formed, which is composed of a number, two or more, of primary scans interlaced. The secondary scan is then repeated a number of times, each time being displaced.

As an example, let us take the scanning standard as used in the Dominion demonstration. This consisted of two 20-line scans intermeshed to form a 40-line scan, this being the secondary field.

The secondary field was then repeated three times, each time being laterally displaced in order to interlace with the other fields so that a final scan of 120 lines was obtained. The following are the advantages that are claimed for this form of scanning over the conventional forms:—

(a) The frame frequency is considerably higher, since it is the frequency of the primary 20-line scan, resulting in a permissibly higher low-frequency cut-off for the communication channel.

(b) A reduction in flicker is effected.

(c) A considerable increase in light efficiency may be obtained by using a scanning spot such that the secondary scan completely fills the field. By doing this there is a relatively small loss definition.

(d) It is possible to employ an optic system of great simplicity and exceedingly high efficiency.

The method in which the scan arranged may be seen from Fig. 2.

The method employed at the Domini can be most easily understood in co junction with the diagram Fig. 3. the transmitter there was a slow-spee slotted disc together with a high-spee mirror drum.

The subject was floodlit and scanne by the combination disc and drum arrangement, the respective speeds which were 500 and 6000 revolutions pe minute. The disc was provided wit twelve slots arranged in the form show in the diagram, alternate slots bein covered with red and blue-green filters.

THE MIRROR DRUM

The mirror drum used had twent mirrors and threw an image of the scen being transmitted on to the disc, th combined action producing a 120-lin scan composed in the manner describe in the section dealing with multi-mes scanning.

The photo-electric cell used in thi gear was one in which the sensitiv surface was composed of rhubidium, material which approaches the huma eye in characteristic although infra-re had to be filtered out before goo results could be obtained.

This is due to the fact that differen colored objects may reflect the same amount of infra-red which would make them appear the same when a cell sensitive to that form of radiation was used. The receiver used in conjunction with the transmitter just described will be seen also in Fig. 3; the process of building up the picture being an exact reversal of that employed at the trans-

(Continued On Page 65)

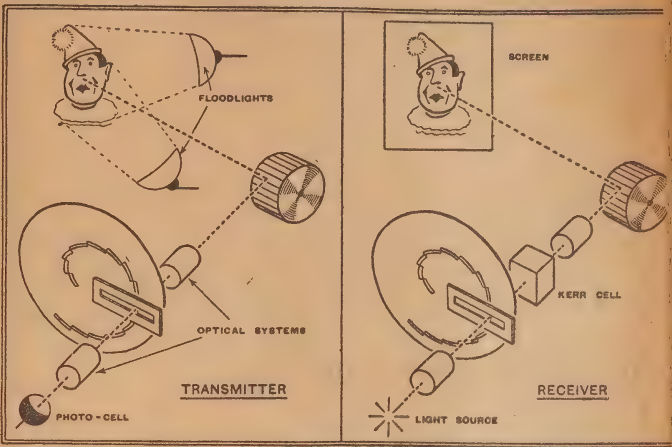


Fig. 3.—The transmitter and receiver layouts of the apparatus used in the demonstration at the Dominion Theatre, London.

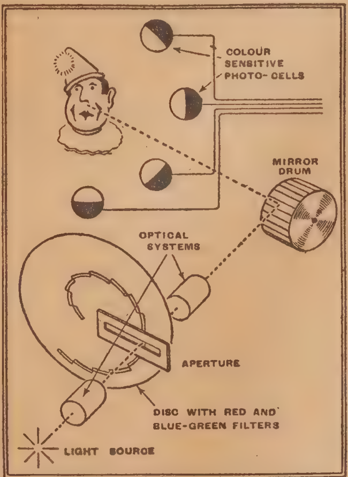

COLOUR SENSITIVE PHOTO-CELLS
MIRROR DRUM
OPTICAL SYSTEMS
APERTURE
DISC WITH RED AND BLUE-GREEN FILTERS
LIGHT SOURCE

Fig. 4.—The use of color sensitive cells as described in the article.

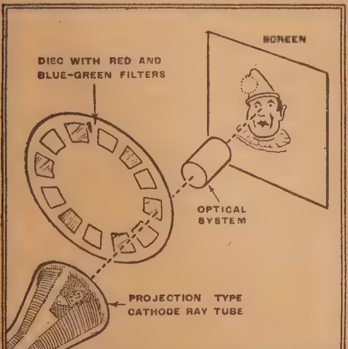
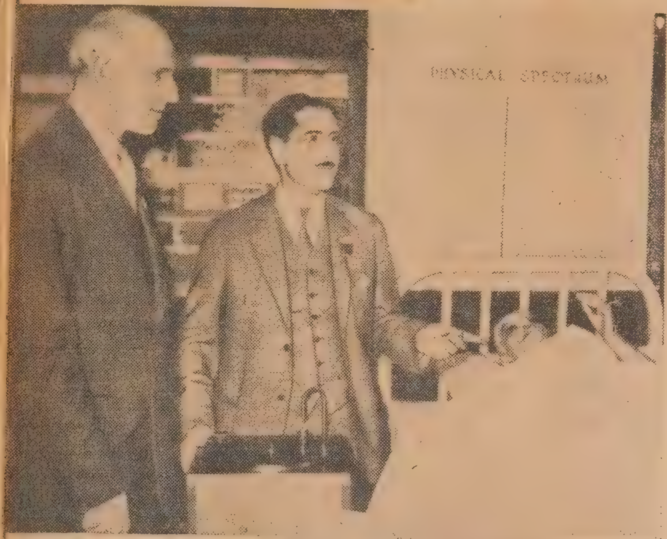
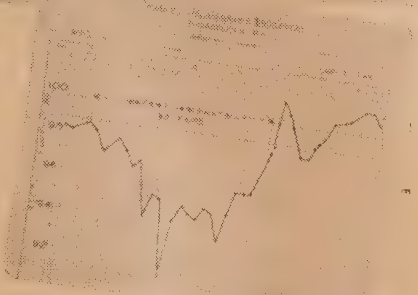

SCREEN
DISC WITH RED AND BLUE-GREEN FILTERS
OPTICAL SYSTEM
PROJECTION TYPE CATHODE RAY TUBE

Fig. 5.—A cathode-ray tube is used at the receiving end.

ROZEN SLEEP FIGHTS DISEASE





he two doctors responsible for ie treatment demonstrating with dummy figure. They are Dr. awrence W. Smith and Dr. emple S. Fay. Chart at the right emonstrates the patient's temerature during test. It ranges from 101 to 91 degrees.

BY
CALVIN
WALTERS

In these days of dictators, wars, and other worries of all kinds have you ever thought that you would like (a la Rip Van Winkle) to go to sleep for an indefinite number of years just while all these things straightened themselves out?

It would be wonderful to wake up in, say, fifty years' time and find that everyone had gone except, of course, all the good and worthwhile people, including yourself, the mortgage forgotten, and everything rosy again. Of course, you wouldn't want to be any older; that's something that would have to be thought of. Then you could start off again from scratch and, who knows, perhaps you would be a dictator yourself some time or a mortgagor after seeing the results of other people's mistakes impressed on things around you.

Well, it appears that all you have to do in order to realise the above desirable ambitions is to hop into your refrigerator and shut the door. At least that is what I gather from the recent experiments of two clever doctors in America.

At a medical convention in St. Louis, Dr. Temple S. Fay and Dr. Lawrence W. Smith, of the Temple University School of Medicine, described an amazing experiment along the lines of freezing people to sleep.

These two doctors took sick women and packed them in ice. The women went to sleep and became completely unconscious. Their normal functions ceased to operate, and their internal temperature came down from a normal 98.4 degrees to well below the accepted minimum before death occurs. In fact the temperature dropped to 91 degrees. The doctors' temperature probably went up!

All bodily functions ceased. The organs of digestion and elimination ceased working, and the pulse beat vanished as far as ordinary tests were concerned. Only by means of the electrocardiograph could the faint heartbeat be detected. The subjects remained in this state of coma for five days, all the time imprisoned in ice.

RESUSCITATION

The experimenters then applied hot external pads and hot coffee, and the subjects awoke "smiling and refreshed." There had been no unpleasant sensations, no feeling of pain. Only an agreeable sensation of sleepiness.

Of course the experiment wasn't carried out in order to try and find some sure way of keeping women quiet. The thirty-two women who submitted themselves to the experiment were suffering from hopeless inoperable cancer. It was hoped that the disease might be checked if not cured.

The women submitted themselves to this treatment intermittently over several months. Sometimes the temperature came down for brief periods to as low as 82 degrees. The results were beyond expectations.

GAIN IN WEIGHT

The women gained weight and their appetite improved (this latter, I imagine, is to be expected after five days without food), their pain was relieved. The tumors shrunk and lesions began to heal, and in some cases disappeared completely. Of course, not all the cases responded permanently and some relapsed after a time. These were the ones who were suffering from very advanced forms of cancer.

No one as yet knows what may come of this amazing experiment, as it is as yet too early, and so new is the method. The doctors concerned make no claim for a cure in spite of the results obtained so far.

Whether freezing would be successful in diseases brought about by the inroads of bacteria is doubtful. Cancer, so far, has not been traced to bacteria for its cause. Rather does it appear to be some enlargement and malformation of the bodily cells, brought about by chemical change or irritation. This theory would be compatible with the results obtained by the freezing experiment.

Freezing would tend to break down the cells of the tissue by arresting bodily functions in such a way that there would be no poisonous or irritating chemicals entering the blood stream, there being none generated in the body owing to the suspension of the action of the organs.

The blood stream, as was proven by tests during the freezing process, was not filling with waste products.

Bacteria, on the other hand, are not killed by freezing. The germicidal effects of low temperatures are very small. Growth of bacteria certainly ceases below 10 degrees Centigrade, but after exposure to a temperature of 252 degrees below freezing point for ten hours, and 170 degrees below zero for several weeks, it has been found that bacteria are not killed, and after being placed again in favorable conditions for their growth, no serious impairment had taken place.

BACTERIA NOT KILLED

Cold temperatures, therefore, act not by killing the bacteria, but by arresting their growth. That is why cold storage, both commercially and domestically, is so popular. It inhibits the growth of bacteria without the addition of any germicidal liquids, etc. But remove the goods into the open air, and the growth of bacteria takes place as before.

As, therefore, cold only inhibits the growth of germs, it is obviously fallacious to assume that freezing sufferers of germ diseases will do any more than lengthen their life, in the case of fatal diseases, or shorten the period of suffering in the case of lesser diseases, by the length of the period of freezing.

On the other hand, the opposite extreme shows greater possibilities. All bacteria can be killed by the application of heat.

In other words, they have a certain high thermal death point.

Certain germs have already been dealt with in this way by artificially raising the patients' temperature in a "radio fever machine."

HIGH TEMPERATURES

If it were possible to find a way to raise the temperature of the human body past the usually accepted death-point, which varies in different individuals, it would certainly add to the possibilities of treating germ diseases. As the temperature has been artificially lowered past the human death point (as we once thought it), it is quite feasible that the other extreme will be attained at some time.

The temperature of the human body is normally 37 degrees centigrade. The thermal death point of tuberculosis bacilli is 60 to 65 degrees centigrade. That of typhoid bacilli is 55 degrees. Of diphtheria, 58 degrees. Of Asiatic cholera about 50 degrees. The only exception to the rule seems to be the germ of cerebro spinal meningitis or "spotted fever."

This germ dies at a temperature of 72 degrees Fahrenheit, which is about 21.3 degrees below normal blood temperature. Whether it is possible for a human being to live at this temperature remains to be seen.

As will be seen from the above figures it would be necessary to raise the temperature of the human body almost to twice that of normal in order to kill the germs of most of the serious diseases. Whether the human being would survive at this temperature also remains to be seen.

The idea of freezing the human body for the treatment of disease is not new. A few years back a Californian experimenter called for volunteers to be frozen alive. Almost 200 people responded. This gentleman asserted that he had frozen monkeys solid, and kept them in the refrigerator for a few days, and then revived them. The authorities prevented the test on the human beings.

Frogs and fish have been frozen in laboratories and have survived none the worse for their experience. In fact, fish have been frozen naturally in rivers. It has been suggested that the ice fields of Northern Siberia be explored in the hope of finding a Mammoth embedded in the ice, so that scientists could attempt to bring it back to life. No one responded.

FANTASTIC SCHEME

One of the most fantastic schemes was propounded by Dr. Alexis Carrel, of the Rockefeller Institute for Medical Research. He suggested that a way might be found of drying people up like a piece of dehydrated fruit or vegetable, and then resuscitate them at some future date. Dry up himself. Perhaps his idea was to soak them i water overnight, and in the mornin you had a fully fledged infant withou any trouble.

Fancy going into the local chemist and asking for a two-year-old boy o a dehydrated girl of sweet sixteen.

This freezing business seems to be the nearest that has been attained to natural hibernation. When animals hibernate, the pulse seems to stop; respiration stops, and among the warm-blooded animals the temperature of the body drops to very nearly that of the outside air.

SUSPENDED ANIMATION

Then, of course, we have with us the Indian magician, who by an effort of will can go into a state of suspended animation in which the life processes all but stop. Russian peasants have been reported to resort to a kind of hibernation, huddling together under piles of furs to pass the winter in times of famine. Lastly, we have that kind of suspended animation that exhibits itself in some of the horses that we back, in those people who owe us money, in the trams when we are late for work, and the gas-man when the gas fails, in some telephone exchanges and public offices.

But not in the horse we didn't back or the people to whom we owe money, and the rent collector, or when our income assessment becomes due or at knock-off time. Such is the selfishness of humanity.

ARTIFICIAL SLEEP TREATMENT IN AUSTRALIA

Although we doubt if the freezing treatment has ever been tried in Australia, we have personal knowledge of another form of artificial sleep which has been used with considerable success in Melbourne. The patient is treated with drugs, which set up a state of suspended animation for some weeks, during which organically sound people have come back to full health, when previously suffering from bad nervous disorders.—Tech. Ed.

One of the most difficult problems confronting the medical man is the treatment of patients who are so nervously exhausted that they are unable to commence the journey back to health because of the vicious circle of worry and continued poor health.

In Melbourne, doctors are following a course of treatment under which the patient is subjected to induced sleep for periods of up to five weeks by means of injections, using a special form of drug.

While in this state the patient is completely unconscious of anything that is happening round about him.

He can be roused sufficiently to be given nourishment, after which he lapses once more into a deep slumber.

The entire suspension of mental and physical activity enables the system to commence its building-up processes, which are otherwise prevented by the depressed mental state of the patien himself.

In a typical case, the patient wi increase in weight, and experience remarkable rejuvenation of all h faculties.

He is gradually brought back to consciousness with the same care which taken in the day or two required fo the injections to have their full effect

No apparent after-effects are notice from the treatment, and, in a week o two, when the injections have complete lost their hold, he is able to resume lif a changed man.

The treatment is naturally expensiv and is given only to those who ar organically absolutely sound. The treatment has opened up a new field i medical circles, and has enabled complete restoration to health in case where other methods have failed to produce any response.

An elementary COURSE IN RADIO for beginners

Being a very elementary course of Radio study for those who wish to know "what makes the wheels go round."

By L. B. GRAHAM, Principal of the Australian Radio College, Pty.,

ESISTANCE, while being essential to the effective control of currents and voltage, causes the greatest amount of loss occurring radio receivers.

esistance is the electrical equiva- t of friction in mechanics. Just as tion dissipates mechanical energy the form of heat, resistance changes trical energy into heat, which is sequently lost. It is impossible to irely eradicate friction and it is ally impossible to eliminate reance.

WAYS PRESENT

esistance is present to a varying dee in all matters through which ctrical current passes. It effects alnating and direct current in an actly similar manner, and is unanged by the frequency of an alterating current.

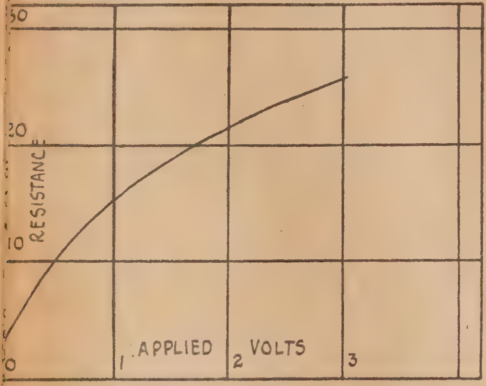


Fig. 3.—This illustrates the rapid increase in resistance of a 2.5 volt pilot lamp, as the operating temperature is increased with the voltage. Carbon resistors show a decrease in resistance as the power dissipated is increased.

The resistance of any matter depends n the type of material, its length, ross sectional area and temperature.

When studying electron movement, was mentioned that the number of lectrons moving in a conductor, deended on the applied voltage and the esistance of the conductor. Dr. G. . Ohm found that there was a efinite relationship between the volage applied to a circuit of given reistance and the current flow. This reationship is known as "Ohms Law." t states that the intensity of a current in any circuit is equal to the electromotive force or voltage divided by the circuit's resistance.

The mathematical formula is then: I equals E/R.

When I equals Current in amps E equals emf. in volts. R. equals Resistance in ohms. This formula may be then mathematically transposed to find the emf. Then E equals I multiplied by R. or again to find the resistance R equals E/I.

These three simple formulae are used very extensively in radio work and they should be thoroughly memorised. Remember, I equals current in amps and not in milliamps.

When a value of current is expressed in milliamps instead of amps. it is necessary to divide the number of milliamps by 1000 to change it to amps. before using the number in the formula mentioned above. For example, what voltage is required to force 10 milliamps of current to flow through a resistor with a value of 10,000 ohms? We use the formula E equals I, multiplied by R, but as the current is expressed in milliamps, we write it as follows: E equals 10/1000, multiplied by 10,000 equals 100 volts.

RESISTANCE CONNECTION

It is frequently necessary in radio work to connect two or more resistances in series or parallel, to get a desired value or to increase the power rating.

The term "series" refers to a connection in which the total current passes through all components of the circuit. Parallel refers to a connection in which the current divides, part going through the various sections.

Resistances in series add together as the current has to pass through them all. If, for instance, two 500 ohm resistors were connected in series, the total opposition would be 1000 ohms.

The total opposition of two equal resistors in parallel will be half that of one resistor, because equal currents will flow through each resistor. The total resistance of any number of equal resistors in parallel is equal to the resistance of one, divided by the number of resistors. For example, five 1000 ohm resistors connected in parallel, give a total resistance of 1000/5 equals 200 ohms.

The value of unequal resistances in parallel may be found by adding their reciprocals and then taking the reciprocal of the answer. The reciprocal of any number is equal to 1 divided by that number. As an example, if one 600 ohm, one 1000 ohm and one 3000 ohm resistor are to be connected in parallel. The reciprocals are: 1/600, 1/1000, and 1/3000.

respectively. The lowest common denominator in this case is 3000. The formula then becomes

$$\frac{1}{600}+\frac{1}{1000}+\frac{1}{3000} \text{ or } \frac{5+3+1}{3000}$$

$$\text{or } \frac{9}{3000}$$

The reciprocal of 9/3000 is obtained by simply inverting it so that it becomes 3000/9, which equals 333.3 ohms. You will see that the combined resistance of the 600, 1000 and 3000 ohm resistors, when connected in parallel is 333.3 ohms. The value of any number of resistors in parallel will always be lower than that of the smallest.

While on the subject, condensors in parallel or series may be dealt with.

Condensers are the direct opposite of resistances, in that condensers in parallel add their capacities and in series we add their reciprocals and take the reciprocal of the answer. The total capacity of any condensers in parallel is equal to the sum of the separate capacities.

A very important characteristic of resistors, when used in radio work, is their power rating, as any resistor which is overloaded, may increase or decrease greatly in resistance value.

Power is a product of both voltage and current. The power in watts being equal to the voltage multiplied by the current. The watt is rather a small unit for electrical work, although quite big enough for radio. A larger unit is the kilowatt, which is the equivalent of 1000 watts. There is a total of 746 watts to one horse power.

RESISTOR RATINGS

The power which a resistor has to handle, may be calculated by multiplying the applied voltage by the resultant current in amps. This is given in the formula W equals E x I. Voltage or E is obtained from the formula E equals I x R, so that if we substitute I x R for E in the above formula (W equals E x I) we have W equals I x I x R or W equals I squared x R.

Again I is equal to E/R, substituting this for I in the formula (W equals E x I) we have W equals E/R x E, or in other words W equals E squared R.

From the three foregoing formulae, relating to power in watts, it is possible to ascertain the power that a resistor will have to handle as long as any two of the three factors, voltage, current, or resistance, are known. As in the case of resistance, I represents the current in amps. not in milliamperes.

To give an example, where the current and resistance are known—if I equals 100 m.a. and R equals 500 ohms, W will then equal

$$\left(\frac{100}{1000}\right)^2 \times 500 \text{ equals } \frac{100 \times 100}{1000 \times 1000} \times 500$$

equals 5 watts.

In a normal radio receiver, the resistors are usually mounted underneath the chassis and consequently do not receive the full benefit of free circulation of air. It is unwise to allow a resistor to handle its full rated power capacity.

The actual power handled by resistor should not be in excess of 1-3 to ½ of its normal rated power.

Resistors used in radio fall into two general classifications, wire wound and carbon types. The wire wound variety usually form the lower value resistors or those which have to handle a considerable amount of power. For instance, bias resistors used in the cathode circuit of tubes, and voltage dividers are usually wire wound.

CARBON TYPES

The carbon types are used when high values of resistance are necessary. These units are manufactured in different ways, but in principle consist of fine particles of carbon, which may be deposited on a glass rod or moulded in some insulating material. With the type using the coated glass rod a ceramic material is formed over the outside.

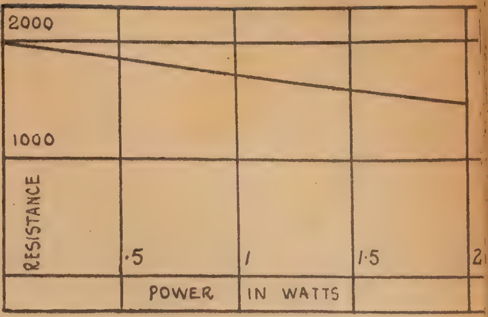


Fig. 2.—Showing a decrease in resistance resulting in an increase in power, characteristic of a wire-wound resistor. This curve is rather a good one, as the change is only about 67 per cent., even with 100 per cent. overload.

The physical size or bulk of a carbon resistor determines the amount of heat it can dissipate satisfactorily, and consequently, to a large extent, the amount of power that it can safely handle.

The physical size of a wire wound resistance likewise determines, to a large extent, the amount of power it will handle.

The following sizes of wire wound resistors gives a very good indication of the physical dimensions necessary to safely dissipate varying amounts of power.

3½in. x ¾in. will dissipate 6 watts.
4in. x 1in. will dissipate 8.5 watts.
5in. x ¾in. will dissipate 9.5 watts.
6in. x 1in. will dissipate 15 watts.
8in. x 1in. will dissipate 21 watts.

The temperature at which a resistor operates has a considerable effect on the effective resistance of the unit. various materials, alter their resistance in a definite ratio, according to the operating temperature. This ratio is known as the temperature coefficient of the material. The resistance of a carbon resistor decreases as the temperature increases, while the reverse is true with wire wound types.

The curve in figure 2 shows the decrease in resistance, resulting from an increase in power and therfore in operating temperature.

The cure represents a very good type of resister, the change in resistance being within 6 per cent. even when 100 per cent. overload is applied.

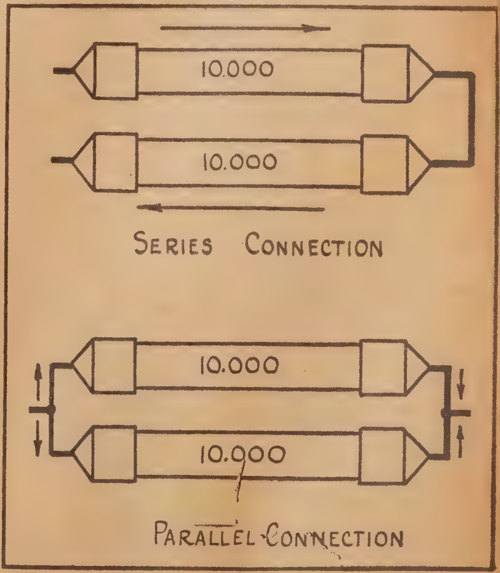
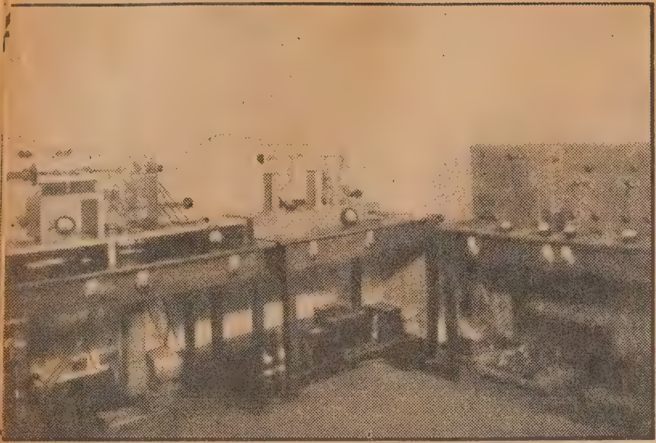


Fig. 1.—In the article will be found reference to series and parallel connection of resistors. The top section of this diagram shows two 10.000 ohms resistors connected in series, to give a total value of 20,000 ohms. Below is a sketch of parallel connection of the same resistors. In this case, the total value is 5,000 ohms.

Some metals change their resistan very rapidly as the temperature is increased. Fig. 3 shows the rapid increa in resistance in the filament of a 2 v. pilot light, as the voltage and consequently the current and power is increased. Of course wire wound resisto do not change their resistance to th same extent as a lamp filament, bu there is a slight increase in resistance a the unit becomes hotter.

When purchasing resistors it is necessary to specify not only the numbe of ohms resistance required, but also th maximum current a resistor wi have to carry or the maximum power in watts it will have t dissipate. The most popular size c carbon resistors is the one watt typ which measure about 1¼in. x ¼in. The are also available in ½ watt, 2 watt an 3 watt sizes. Wire wound resistors ar generally rated according to the numbe of milliamps of current, which they ca safely carry without overheating. Standard current carrying sizes are 25, 5 100 and 150 milliamps, but special size are readily available.



ow powered stations operate very well when using the new system. This experimental ansmitter, W2XCR, humble though it is, impressed greatly engineers who heard it in action. Power is 600 watts.

Each month, interest in Armstrong's new method of transmission continues to grow. In U.S.A. special receivers are now available for use with such transmitters. In an endeavor to give a simple explanation of the system, we cannot do better than reprint this article which appeared some little time ago in "Short Wave Craft." It gives an excellent idea of elementary principles.

THE THEORY OF FREQUENCY MODULATION

THE method by which this remarkable progress in radio communication has been accomplished is lled frequency modulation. This ethod of modulating a radio transitter has been known as long as has modern radio communication, but it has been redesigned and improved by Major Armstrong in the last 10 years to such an extent that it can now be used for radio transmission.

This great aerial system was built for use in connection with tests concerning Major Armstrong's transmission system. It is 900ft. above sea level and contains two sets of four horizontal dipoles. He operates in conjunction with a 40 kw. transmitter operating on 42.8 mc. Testing is being carried out at the present time.

SIGNAL TRANSMISSION BY MEANS OF WATER

Before we go into the technique of frequency modulation it may be of value to demonstrate by means of an easily understandable experiment the function of amplitude modulation, which is exclusively used for all kinds of radio transmitters now in operation. But since radio waves are invisible we shall take a visible medium to demonstrate amplitude modulation. The best suitable medium for comparison with radio waves is water, and that it is quite possible to use water as a means of communication will be demonstrated by Fig. 1, which shows at the left side a "water-transmitter" and at the right side a "water-receiver."

CODE SIGNAL TRANSMISSION

To transmit code signals from the transmitter to the receiver the operator uses a valve which interrupts the flowing water into long and short periods. actually consisting of dot and dash impulses. These water impulses are directed against a disc, at the receiving end the disc having an inking pen or stylus which is moved by the incoming code impulses over long or short periods against a paper-tape, where the message is written down as code signals. Experienced readers have recognised already that this communication system by means of water operates in about the same manner as a radio transmitter sending out code signals.

But music transmission: In case music or speech is to be radiated by a transmitter not only impulses of varying length and equal power need to be sent, but the signals must also be transmitted with dynamic variations. Described in other words—"Since music consists very often of a succession of one and the same tone, but reproduced with varying power—the signals to be transmitted have to be sent out with varied volume—or 'amplitude,' as the technicians call it."

AMPLITUDE MODULATION

AMPLITUDE VARIATIONS

Therefore, when music is to be transmitted it is necessary to apply the so-called amplitude modulation. Fig. 3 shows how this is done. The water beam is not only cut off into parts each of different length, as in the case of code transmission (compare Fig. 2), but the single "water cuts" are sent out with varying heights of the water level, or as the radio engineer would call it—"with varying amplitude." This effect is easy to obtain through the use of proper fitting valves of special design. The re-creation of these water amplitudes into sound of different tone volume can easily be obtained by means of a drum as demonstrated by Fig. 5. The principle of this transmission system, expressed in a few words, is as follows: At all occasions where a particular audio frequency has to be transmitted with greater volume, the amplitude (the water level) must be increased, and vice versa.

If we compare Fig. 3, which shows music transmission with varying amplitude of the water-level, with the curve presented in Fig. 4, which shows the two side-bands of an "amplitude modulated" radio transmitter, we shall easily recognise that our water transmitter actually produces amplitude modulation.

FREQUENCY MODULATION

FREQUENCY VARIATION

Many amateurs become frightened if they merely hear the name frequency modulation. This attitude towards the latest progress in radio communication is not reasonable; if we understand amplitude modulation there is no reason why we should not understand frequency modulation. That this opinion is correct will be demonstrated by means of another water transmitter analogy of slightly different design.

Instead of one water pipe (used in Fig. 1 as the signal carrier), a great many are employed in the system shown by Fig. 5. Each of these several pipes is furnished with a valve operated by "remote control" to cut off the the water beam or jet into parts of varying length, but there is one great difference between the system shown in Fig. 1 and Fig. 5.

Series of pipelines for each particular amplitude: In the system shown in Fig. 1 the various "water cut-offs" are transmitted over one and the same pipe, regardless of whether they have a small or large amplitude. In the transmission system of Fig. 5, signals with a small amplitude are transmitted over pipeline No. 1, but signals of medium amplitude require 3 or 4 pipelines, and consequently signals of large amplitude require all the pipelines.

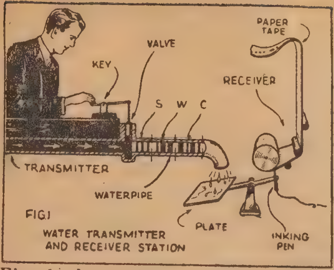
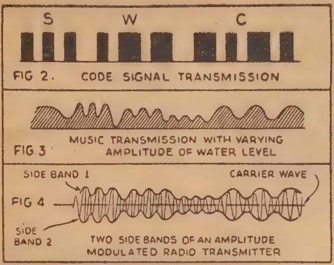
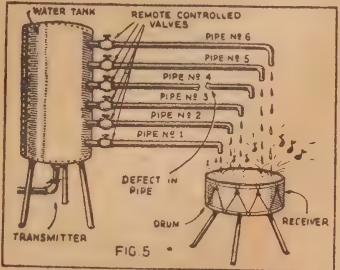


Fig. 1 above shows simple "water jet" analogy of modulation, the signals being transmitted over one water pipe in this instance.


S
W
C
FIG 2.
CODE SIGNAL TRANSMISSION
MUSIC TRANSMISSION WITH VARYING AMPLITUDE OF WATER LEVEL
FIG 3
SIDE BAND 1
CARRIER WAVE
FIG 4
SIDE BAND 2
TWO SIDE BANDS OF AN AMPLITUDE MODULATED RADIO TRANSMITTER

Diagrams above show graphically various aspects of modulation.



In Fig. 5, above, an analogy is shown of the new "frequency modulation" system, the signal being carried by numerous channels or pipes.

TRANSFORMING INTO SOUND

How the signals of various amplitude which are to be received, are transformed into sounds of equivalent volume, is easy to understand from Fig. 5, showing a drum placed below the various pipe openings.

Broken line does not interrupt transmission: This kind of transmission has of course, the disadvantage that considerably more space is needed to install the many pipelines. However, it has the marked advantage that in case one pipe has become defective during reconstruction work (for example, excavation in a city street), the transmission will not be affected to a great extent, since the broken pipe is used only during a par the entire transmission time. Du the period of use it is employed to tr mit only a particular volume of the to be transmitted, or, as the tec cians says—a particular amplitude.

One transmitter radiates a great m frequencies: In radio transmission means of frequency modulation the s condition exists as in multiplex w pipeline transmission. The principle radio communication are shown by 6. We see that the transmitter at left radiates not only a single freque band (as in the case when "amplit modulation" is used), but a great m different frequency bands.

In case a tone of small volume is be transmitted it will be sent over ch nel No. 1, for example. For a tone medium volume, channels No. 2, 3, 4 will be employed, and if a tone of v great volume is to be transmitted, t all six channels will be used.

ATMOSPHERIC INTERFERENCE

DOES NOT AFFECT TRANSMISSIC

That atmospheric interference can disturb a frequency modulated tra mission is explained by Fig. 6. We kn from experiments that atmospheric el tricity has a frequency band which rather broad, and which moreover ac ally covers a considerable part of radio frequencies in use at present. A we also know that a few of these ma frequencies contained in atmosphe electricity are especially powerful.

When atmospheric electricity distur our reception it is mostly due to su a powerful frequency. The disturban which we meet is due to the fact th such a powerful interference has c lided with the frequency of the stati we wish to receive.

ONLY ONE CHANNEL

MAY BE DISTURBED

As long as only one channel is avai able (as in amplitude modulation), a this channel is disturbed, the enti communication is cut off, or, at leas considerably disturbed—in other wor we hear plenty of "static!" However, we have many channels, as in the ca of frequency modulation, we obtain a effect similar to the one demonstrate in Fig. 5.

The system presented in Fig. 5 show that though one pipe, or even two, ma be put out of order, all the other on will remain unaffected! About the sam thing will happen in radio communica tion, if many frequency channels (as i the case of frequency modulation) ar used. One particular channel may b affected, but since this particular channel is used only for a part of the entir transmission time, the disturbance wil have no considerable effect; sometime it will not be recognisable at all.

HOW FREQUENCY MODULATIO

IS PRODUCED

After we have studied the principa facts about frequency modulation, anc its advantages in effecting radio com-

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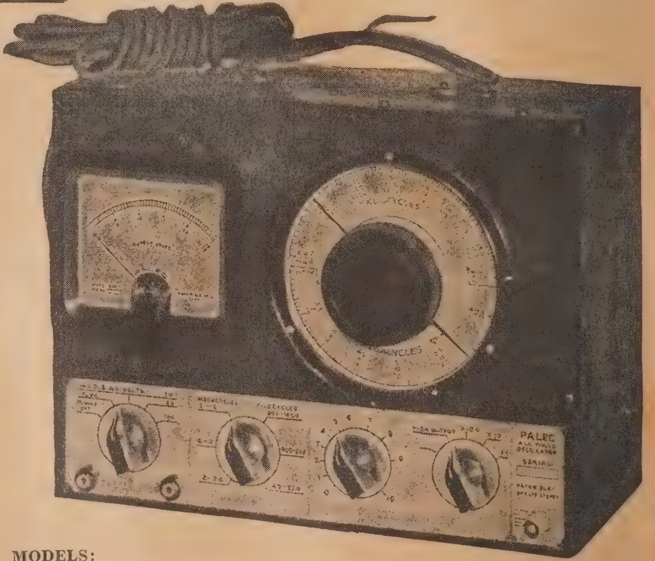

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munication—"without interference"—there remains only to explain how this new kind of modulation may be obtained. This is also quite easy to understand, and will be demonstrated by the aid of Fig. 7, which shows the principal diagram of a transmitter. Parallel to the condenser of the tuning circuit, an additional small condenser (in the form of a condenser microphone) has been connected. This condenser microphone acts in about the same manner as a "trimmer" or band-spread condenser; an auxiliary of radio reception which is often applied in receivers of modern design.

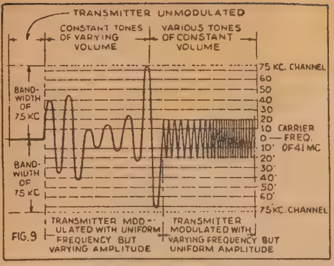
We know from the operation of our receivers that in case we vary the additional small condenser, the frequency tuning of our receiver changes. Exactly the same variation of frequency tuning is obtained when the announcer shown in Fig. 7 speaks into the condenser microphone. The sound waves hit the plates of the condenser microphone, and make them vibrate, or, described in other words—"the distance between the plates of the condenser microphone changes." We know that by changing the distance between the condenser plates, the capacity value of a condenser changes. Therefore, it is easy to understand that the vibrating plates of the condenser microphone must affect the frequency radiated by the transmitter.

As long as the announcer speaks softly the frequency fluctuations of the transmitter will be small. But in case he raises his voice very much, the plates of the condenser microphone will vibrate to a larger extent, and consequently the frequency of the transmitter will vary greatly; or, more technically expressed—the frequency of the transmitter "swings out" to a larger extent.

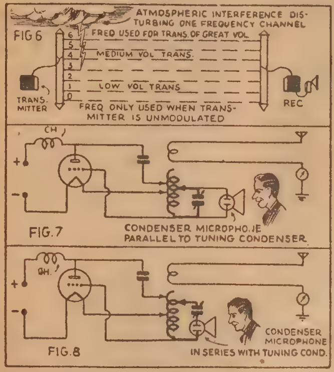
SOMETHING ABOUT THE "FREQUENCY SWING"

The expression "swings out" describes much better what actually happens when frequency modulation is applied, than the expression we have used until now: "the frequency varies!" In reality, the transmitter varies its frequency not only in one direction (as demonstrated by the simplified diagram of Fig. 6) but the frequency swings to both sides of the "carrier frequency" (marked O in Fig. 9). This "swing effect" is easy to understand if we keep in mind that the condenser microphone is not always compressed by the sound impulses, but also expands—in a reversed direction—and in the same degree as it was compressed.

That means, as Fig. 9 indicates, the "carrier frequency" not only increases in its frequency value, but also decreases.


TRANSMITTER UNMODULATED
CONSTANT TONES OF VARYING VOLUME
VARIOUS TONES OF CONSTANT VOLUME
BAND-WIDTH OF 75 KC
BAND-WIDTH OF 75 KC
75 KC. CHANNEL
60
50
40
30
20
10
CARRIER FREQ. OF 41 MC
0
10'
20'
30'
40'
50'
60'
75 KC. CHANNEL
TRANSMITTER MODULATED WITH UNIFORM FREQUENCY BUT VARYING AMPLITUDE
TRANSMITTER MODULATED WITH VARYING FREQUENCY BUT UNIFORM AMPLITUDE
FIG.9

What the actual frequency band employed by Major Armstrong looks like, when modulated.


ATMOSPHERIC INTERFERENCE DISTURBING ONE FREQUENCY CHANNEL
FIG 6
6
5
4
3
2
1
0
FREQ USED FOR TRANS. OF GREAT VOL
MEDIUM VOL TRANS.
LOW VOL TRANS
TRANSMITTER
REC
FREQ ONLY USED WHEN TRANSMITTER IS UNMODULATED
CH
+
-
FIG.7
CONDENSER MICROPHONE PARALLEL TO TUNING CONDENSER
CH.
+
-
FIG.8
CONDENSER MICROPHONE IN SERIES WITH TUNING COND.

These diagrams show the principle of radio transmission by means of "frequency modulation," operating with several sets of frequency bands (Fig. 6). Figs. 7 and 8 show how a simple condenser-type microphone may establish simplest form of "frequency modulation."

THE "BAND WIDTH" NECESSARY

As Fig. 9 shows, the frequency marked as No. 0 (carrier frequency) swings for example not only to channel 40 in a specific case, but also back to channel 40 deg., etc. In practice, the width of the swing is considerably larger as it is possible to recognise from Fig. 9. Major Armstrong, for example, who uses the two kilowatt transmitter located on top of the Empire State Building, in New York City, operates this ultra short-wave transmitter, on a frequency of 41 mc. (Megacycles). The carrier frequency of 41 mc. swings to both sides to such an extent that the entire band-width of the transmitter covers a frequency ra of 150 kc.

PERCENTAGE "BAND WIDTH" QUITE SMALL

The required frequency range of 1 k.c. for a single transmitter appears, first glance, quite large, but we have keep in mind that a transmitter opera ing with such a band-width in the ultr short-wave range (between 1 and meters) occupies (by percentage) mu less space than a transmitter operati with the usual band-width of 10 kc. the "broadcast" band.

The wave range between 5 and meters appears, at first, quite sma However, if we express the width this wave range in frequencies or cycle we find that it actually involves a fr quency band of 30,000 kc. (30,000,0 cycles).

If we figure out how much this ban width is expressed in frequencies of a short wave channels above 10 meter together with all broadcasting and lon wave channels, we will ascertain th this tremendous wave range involves no more than 30,000 kc. Again, if we tr to find the percentage of space require by a single transmitter, figured on th frequency basis in relation to the mete basis, we will find that a single transmit ter, operating with 10 kc. band-width i the broadcast band, requires 2 per cen of the entire space of the broadcas band. A frequency-modulated transmit ter with a band-width of 150 kc., oper ated in the ultra short-wave range, re quires (figured on a similar basis) 0 per cent. only.

The modulation system actually em ployed: Before closing this descriptio it seems necessary to remark that th modulation system shown in Figs. 7 an 8 are the more simple methods of fre quency modulation. Since the micro phone must be mobile, to give the broad cast studios the necessary freedom t move it (far away from the transmit ter) to any place desired, Major Arm strong has developed a similar modula tion system, but of different design.

Should Power Transformers Run Hot?

A MATTER OF EFFICIENCY

Many set builders become unduly disturbed when they find that the power transformer of their set becomes warm in operation.

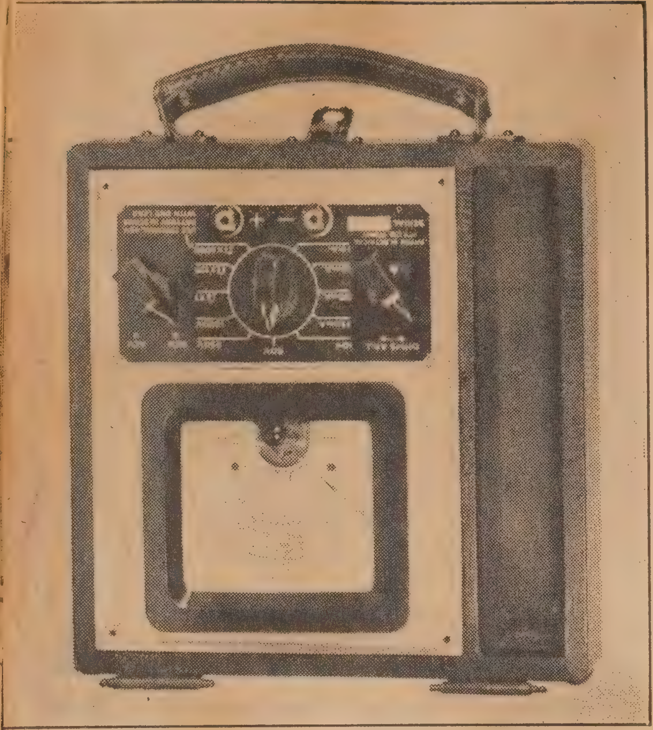
Actually, this is unavoidable. A transformer which ran perfectly cold under load would be probably much underloaded and far larger than the job requires.

The heat generated in a power transformer is caused through losses in the core, and in the windings. Although very large transformers show high degrees of efficiency, if the iron used is good, smaller types may be much less efficient.

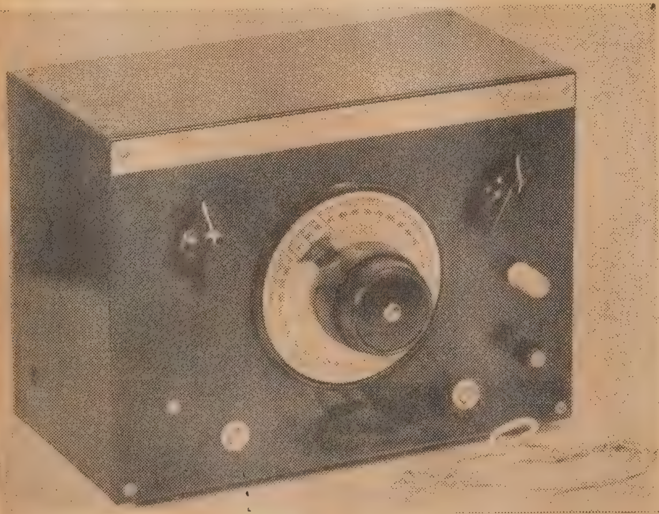
The losses are dissipated in the form of heat, and the ordinary transformer will usually run warm to the touch. It is a matter of compromise between the proportion of iron and copper wire (iron being the cheaper), and the highest temperature which can be allowed with safety. An undue preponderance of iron over copper will naturally result in a transformer less efficient than one with a higher number of turns per volt.

A transformer which runs so hot that it is almost too hot to touch will probably be overloaded, or have a shorted turn in one of the windings. Although it will need to get very hot before a burn-out is likely, should there be a shorted turn, this unfortunate end is almost inevitable.

Always investigate the load on a transformer which gets too hot to touch. If it still runs hot when all load is removed, a definite fault is indicated, and a new transformer will be needed.



This multimeter was described in its original form in our July issue. In the August issue instructions were given concernng the addition of a rectifier which allowed accurate measurement of A.C. volts as well. Every serviceman and serious experimenter should have a meter of this type.



The modulated oscillator referred to in this article. In our June issue the oscillator was described as being designed for operation from the A.C. mains. The oscillator redesigned to work from batteries appeared in Radio and Hobbies for September. Either of these oscillators may be relied upon for excellent service.

HOW

THE object of this article is to show you how to align radio receivers, using either the A.C. or Battery operated oscillators recently described in this magazine.

The performance of a modern superheterodyne receiver is determined to a tremendous extent by the accuracy with which the tuning circuits are aligned. If a new receiver is to perform to the best of its ability it should be carefully aligned, and to carry out this work efficiently it is advisable to use a modulated oscillator.

Even if a set has been accurately aligned in the first place, the resonant frequency of the various circuits will change slightly over a long period of time, due largely to effects of temperature and humidity, so that after a year or two it should be realigned.

The battery and A.C. operated oscillators designed by Radio Equipment Pty. Ltd., and described in recent issues of this paper are quite satisfactory for accurate alignment work. This article tells you how to carry out the alignment of a set with the aid of either of these oscillators.

OUTPUT METER

In addition to an oscillator another instrument which is of great assistance in aligning a receiver is an output meter. Unfortunately in some respects, and perhaps fortunately in others, the human ear is not very sensitive in detecting slight changes in the strength of a sound.

Even though the signal from a radio receiver may be increased to double its original power, this would only represent an increase of 3 decibels, which is just an audible increase to the human ear. If, instead of judging the strength of sounds from a receiver by ear during the alignment process, we measure the strength of the sounds with an output meter, this will accurately indicate even small increases or decreases, and it will be possible to do much more accurate work.

An output meter is simply some form of A.C. voltmeter which usually has a condenser connected in series with it to prevent D.C. voltage from the plate circuit of the output tube from affecting its reading.

Any ordinary voltmeter or multimeter which is capable of measuring A.C. voltages can be used as an output meter by connecting a .5 mfd. condenser in series with one of the test leads as shown in Fig. 1.

If an A.C. meter is not available, a D.C. meter can be used by employing it

TO ALIGN RADIO RECEIVER

In recent issues, we have described several items of test equipment in RADIO AND HOBBIES. Among these were two test oscillators, one operated from batteries, and one of the A.C. type. This article gives detailed instructions of how the oscillators are used in actual service work. By their aid, it is possible to line up any modern receivers of any number of valves.

By R. LACKEY

(Chief Instructor, Australian Radio College)

in conjunction with some form of rectifier. One very simple arrangement consists of any ordinary tube connected as a diode by joining the control grid and all other elements but the filament or cathode together. This arrangement is shown in Fig. 2.

The meter can be any ordinary 0-1 D.C. milliammeter or for that matter, any milliammeter up to 10 m.a. is suitable. On the other hand a D.C. voltmeter up to about 25 volts can be used provided it has a sensitivity of 100 ohms per volt or more.

As the tube will only be operating for a short time its filament can be operated from a dry cell battery of suitable voltage or if an A.C. tube is used its heater can be supplied from the transformer in the receiver or from any other convenient source. Incidentally any of the 1.4 volt or two-volt battery series will work quite well from a single 1.5 volt torch cell.

In using an output meter one terminal should be connected to the plate of the output tube, while the other connects to the chassis of the receiver.

THE I.F. TRANSFORMERS

The first step in aligning a receiver by means of an oscillator is to carefully tune the I.F. transformers to the correct intermediate frequency. Practically all modern receivers are designed to use an intermediate frequency in the vicinity of 460 kc.

Two very commonly used frequencies are 458kc. and 462.5kc. These frequencies have been carefully chosen, so that no annoying whistles are heard when tuning to any of the important stations.

The first step, then, is to decide upon the I.F. to be used and to set the dial on the oscillator so that it produces this frequency. If the oscillator has been carefully calibrated in the first case, no difficulty should be experienced in setting it to the desired frequency.

Now connect the output leads of the oscillator to the control grid cap of the I.F. amplifier and with the attenuator of the oscillator set so that the signal can just be comfortably heard from the speaker, or so that it gives a small reading on the output meter, adjust the trimmer condensers in the last I.F. transformer for greatest output.

In sets employing automatic volume control it is very important to turn the oscillator's attenuator to a position where it gives a very weak output. This will prevent the automatic volume control system from giving misleading results in setting the I.F. tuning condensers.

In adjusting the screws in the I.F. transformers it is best to use a proper aligning tool or a screwdriver which has a few turns of insulation tape wound around it near the tip to prevent the screwdriver coming in contact with the adjusting screw and the metal can of the transformer at the same time. This precaution is particularly important when aligning battery operated receivers.

FIRST I.F. TRANSFORMER

After having aligned the second I.F. transformer you should remove the oscillator's output leads from the grid of the I.F. tube and place it on the
cap of the preceding tube. In r
cases this will be the first detecto
frequency changer. Now proceed to a
the I.F. transformer immediately fol
ing this tube in the same way as
aligned the other I.F. transformer
the receiver employs two I.F. stage
that three I.F. transformers are u
it will be necessary to place the ou
lead of the oscillator on the grid of
next tube working toward the ae
and then align the first I.F. transfor
in the same way as the other two.

The majority of I.F. transformers
the market at the present time
aligned in the factory to approxima
460kc. so that very little readjustm
should be necessary in tuning th
accurately to the desired intermed
frequency.

Before starting to align the I.F. tra
formers it is a wise precaution to sh
circuit the oscillator section of

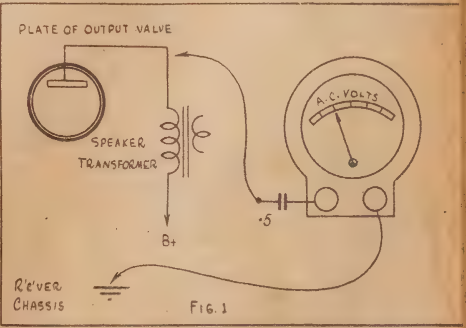


FIG. 1

Fig. 1.—Using an A.C. meter to operate as an output meter when lining up a receiver. Connect as shown.

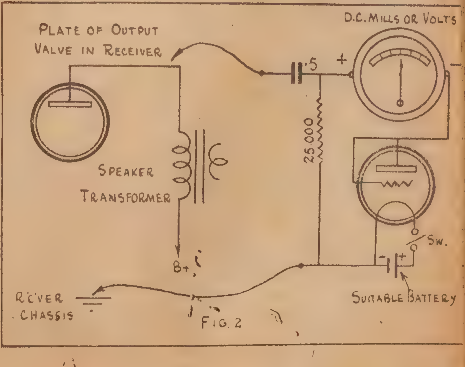


FIG. 2

Fig. 2.—How to use a D.C. meter for reaching output volts. A valve connected as a diode is used for a rectifier.

ning condenser gang by means of a all piece of wire. This prevents the ssibility of the oscillator frequency oducing spurious intermediate frequencies and giving misleading results.

LIGNING THE BROADCAST COILS

After the I.F. transformers have been mpleted they should not on any count during the rest of the aligning ocedure be altered.

The next step is to connect the out- t leads of the oscillator to the aerial d earth terminals of the receiver and remove the piece of wire which was ort circuiting the oscillator section of e condenser gang. The oscillator ould be carefully adjusted to produce frequency of 1400kc. and the receiver ned to pick up this signal.

In simple broadcast receivers you will nd a small adjustable trimming connser mounted on top of each section the tuning condenser gang, while in al wave receivers the trimming connsers are usually mounted on the coils emselves, there being one set of immers for the broadcast coils and one t for the short wave coils.

In small sets which do not possess R.F. amplifying stage there are two immers for each band, these tuning e aerial and oscillator coils, while in rger sets employing an R.F. amplifying age there are three trimmers for each nd tuning the aerial, R.F., and oscil- tor coils. Now commence screwing e oscillator trimmer about two-thirds of the way down, and carefully adjusting the tuning dial for maximum output.

Next adjust the aerial trimmer and R.F. trimmer, if one is used, for maximum output. In carrying out this work the first time, it is necessary to completely disregard any markings on the tuning dial.

The Padding Condenser. After having adjusted the trimming condensers at 1400kc., the oscillator should be set to produce a frequency of 600kc. and the receiver carefuly tuned to pick up this signal. If an output meter is used, adjust the attenuator on the oscillator so that the needle rests on some particular scale division, say half way up the scale.

Now screw up the padding condenser about ¼ of a turn and retune the oscillator signal by means of the tuning dial.

Note whether the output meter reading is now stronger or weaker than previously. If the output is stronger continue to adjust the padding condenser in the same direction as before, but each time you make an adjustment to the padder, remember that it is absolutey necessary to carefully retune the dial before judging whether the output has increased or not.

If the first adjustment of the padding condenser resulted in a decreased output, it is necessary to unscrew the condenser about a ¼ of a turn and then retune the set before noting the output strength.

By making an adjustment of about ¼ of a turn at a time and carefully retuning the dial each time, before the output strength is noted, you will soon find the point at which the padding condenser permits the receiver to give its greatest output. The padder should then be left in this position.

SETTING THE TUNING DIAL

Now that the padding condenser has been adjusted at 600kc. you can proceed to set the tuning dial, so that its pointer falls correctly on the name of some station at the low frequency end of the band. To do this work it is advisable to dispense with the oscillator, connect an aerial and earth to the aerial and earth terminals of the receiver and tune in some station operating on a frequency of about 600 kc.

In New South Wales 2FC can be used. Now loosen the dial on the tuning condenser shaft or loosen the pointer on the dial and adjust the dial so that the pointer lies exactly on 2FC's marking when 2FC's signals are being clearly received. In this way you have set the dial correctly for stations at the low frequency end of the band.

The next step is to make the dial accurately indicate stations at the high frequency end of the band. This is accomplished by tuning in some station operating at about 1400kc. and noting whether the dial pointer falls nearer the high frequency end of the dial than the correct point, or whether it

(Continued on Next Page.)

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This is the original kit used by "Radio and Hobbies," obtainable from Radio Equipment Pty., Ltd. Ranges: 0-10, 0-50, 0-250, 0-1000 volts D.C. and A.C. 0-1, 0-10, 0-50, 0-250, M.A. 0-500, 0-50,000 ohms with internal battery. 0-1.5 megohms, with external 45 V. battery.

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MULTIVIBRATOR SIMPLIFIES LININ

The multivibrator is a form of oscillator which, in addition to the usual fundamental frequency, produces also a large number of equally-spaced harmonics. For this reason and also for the fact that it is simple to design and construct and hence relatively inexpensive, it is extremely useful in service work.

THE usual form of multivibrator oscillator consists of a two-stage resistance-coupled amplifier, in which the output voltage of the second valve is fed back through a resistive capacitive network to the grid of the first valve. The fundamental frequency and hence the spacing of the harmonics is determined by the time constant of the coupling condensers and resistors. A multivibrator may be designed having a fundamental frequency of approximately 500 c/s, and producing harmonics spaced every 500 c/s to approximately 20 Mc/s (15 m.).

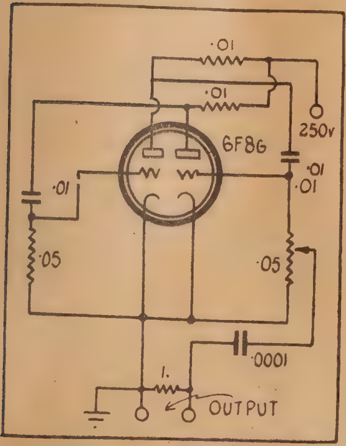

Fig. 1.—The A.B.C. version.

The high-frequency harmonics may be picked up by a normal radio receiver, but are too close to be individually separated, and constitute a continuous signal across the whole of each wave-band. After rectification, the audio-frequency components consist of the fundamental 500 cycle tone together with its audible harmonics.

A. C. CIRCUIT

Fig. 1 shows the circuit of a practical multivibrator oscillator using the twin-triode type 6F8-G. The amplitude of the harmonics steadily decreases with increase of frequency although from an experimental oscillator sufficient output voltage could still be obtained at 12.5 metres to align a sensitive receiver.

The output voltage may be varied by means of the 0.05 megohm potentiometer in the output circuit, but complete attenuation can only be accomplished if the whole assembly is effectively shielded. The same general precautions are necessary as outlined in connection with modulated oscillators.

Total plate current for the two triode sections of the oscillator shown is approximately 15 milliamps.

Fig. 2 shows an alternative design using type 1G6-G operating entirely from dry batteries. The battery d is very low, being 100 mA. for the ment and approximately 3 mA. for plate supply.

The output on all bands is less t that given by the A.C. version. bu

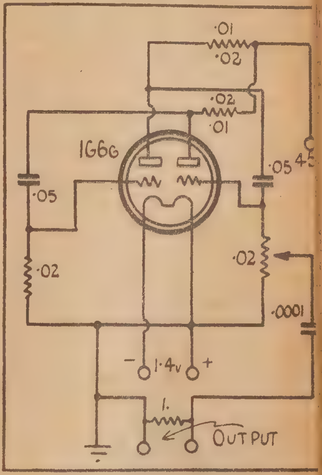

Fig. 2.—The Battery version.

useful up to approximately 15 Mc (20 m.) above which the output fa off rapidly.

(Continued on Page 65)

HOW TO LINE UP YOUR RECEIVER

(Continued fr Previous Page

falls nearer to the centre of the dial than the correct position.

If the pointer is nearer the high frequency end it will be necessary to unscrew the trimmer on the oscillator coil slightly until the station is received at its correct position. For the time being do not worry about the aerial and R.F. trimmers.

On the other hand, if the dial pointer were nearer the centre of the scale, it will be necessary to screw up the oscillator trimmer slightly until the station is found at the correct dial setting.

After the oscillator trimmer has been adjusted in this way, remove the aerial wire from its terminal and connect the oscillator's output leads in its place. The signal from the oscillator should then be used for readjusting the aerial trimmer and the R.F. trimmer if one is employed.

This is done by carefully tuning in the oscillator's signal and without altering the trimmer which tunes the oscillator coil, readjust the aerial and R.F. trimmer for maximum output.

After you have completed this, you may find that these adjustments have slightly upset the accuracy of the dial setting at the low frequency end. If this is the case, readjust the dial on the tuning condenser shaft until these stations are again accurately received and repeat the process just described at the high frequency end so that these stations are also received at the correct dial setting.

This should complete the alignment of the broadcast section of the set and in the case of a simple broadcast receiver the set should now operate to its best ability.

THE SHORT WAVE SECTION

Most dual wave receivers do not employ an adjustable padding condenser, and this considerably simplifies the alignment of the short wave section. In aligning this section simply connect oscillator output leads to the aerial a earth terminals, and if the recei covers the ordinary short wave band about 16 to 50 metres, set the oscilla to produce a signal of 20 metres or megacycles. Now screw the oscillat trimmer condenser in or out until t signal from the test oscillator is r ceived with the tuning dial indicati 20 metres. After this, adjust the aer and R.F. trimmer if one is used maximum output.

As there is no adjustable padding co denser there is no need to align t short wave section at the low frequen end of the short wave band, so th the one adjustment at 20 metres con pletes the alignment of this section.

If the alignment has been carefu followed out, and there are no oth faults in the receiver you can rest a sured that your set is performing the best of its ability.

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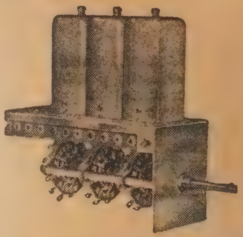

DUAL WAVE UNIT

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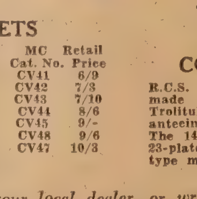
Air Core, 2nd, 460 K.C., sq. can, 3in. x 1 3-8in., Cat. No. IF108. Retail Price, 7/6.

Iron Core, 1st, 469 K.C., sq. can, 3in. x 1 3-8in., Cat. No. IF109. Retail Price, 11/-.
Iron Core, 2nd, 460 K.C., sq. can, 3in. x 1 3-8in., Cat. No. IF110. Retail Price, 11/-.



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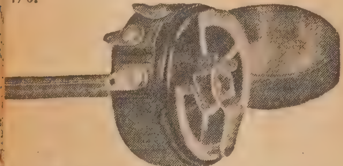
Permeability Tuned R.F. Coil, 460 K.C., Cat. No. E280. Retail Price, 8/6 ea.
Permeability Tuned Oscillator Coil, 460 K.C., Cat. No. E281. Retail Price, 8/6 ea.

W 4/5 DUAL WAVE unit type DW29, nprising aerial and oscillator coil unted on wave change switch, comte with padder.
W. Unit Cat. No. DW29. Retail Price, 7/6.



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25	3.5	4	CV36	4/-	CV43	7/10
35	4	5	CV37	4/3	CV44	8/6
50	4	7	CV38	4/9	CV45	9/-
70	5	9	CV39	5/4	CV48	9/6
100	6	14	CV40	5/11	CV47	10/3

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400	,,	Potentiometer	50 M/A	,,	,,	PT46	5/-
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5000	,,	,,	30 M/A	,,	,,	PT51	5/-
10000	,,	,,	20 M/A	,,	,,	PT52	5/-
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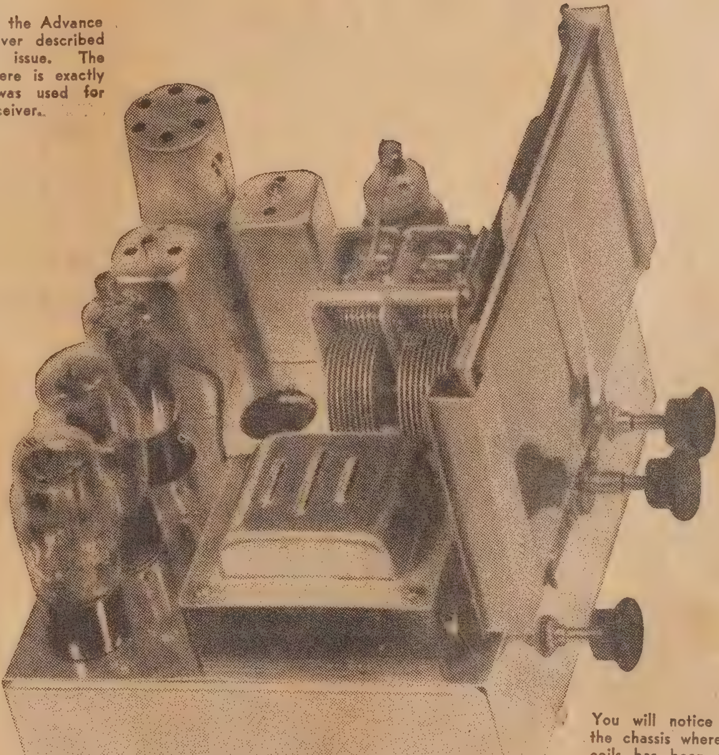
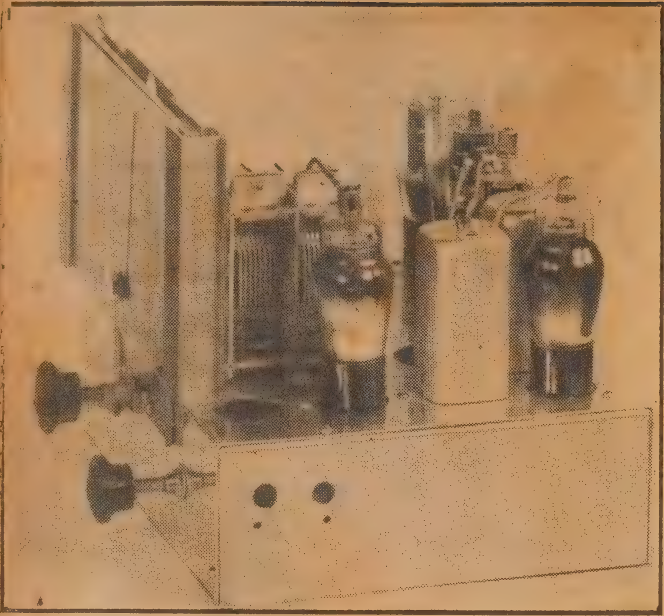
THE DUAL-WAVE "ADVANCE 1939"

A companion to the Advance Broadcast Receiver described in last month's issue. The chassis shown here is exactly the same as was used for this receiver.



You will notice the hole in the chassis where one of the coils has been removed. All coils are now contained in the unit below the base.

HOW TO MAKE AND ADJUST IT!



Here is a view of the set from the front. Note that it is quite a small chassis—small enough to fit into practically any cabinet.

A SIMPLE

LAST month's description of the Advance 1939 brought the expected comments from our readers—"What about a set of the same kind for dual-wave work?" "Can I use this set, but with a dual-wave tuner?" and so on.

Such requests were only to be expected. The five valve dual-wave set is about the most popular receiver there is. It is some little time since we described such a set, either in "Wireless Weekly" or in "Radio and Hobbies."

Actually, there is nothing to prevent anyone from wiring up the set just as it was originally described, and using a dual-wave tuning bracket. Except for the omission of the oscillator grid condenser, the circuit would be perfectly suitable.

In fact, we ourselves made the changeover to this tuning unit, and the receiver operated immediately. We didn't even bother to change the gang—we just backed off the trimmers, and went ahead.

SAME CHASSIS

The same chassis was employed—the only difference in layout was of course, the removal of the broadcast coils from the top of the base, and the mounting of the dual-wave bracket.

There is no reason why the set should not have been described without further change, had we wished to do so. However, for several reasons, we decided to give the receiver a little more thought.

First of all, there would be little point in describing the set which would in fact, be the same as last month's, except for the change in coils. Most people could do as much for themselves, without any further help from us.

The original set was built as a simple and very cheap receiver, which could be used in a table model cabinet, or in a small console. You will remember that we closed our eyes to one or two things about it, so that this object would be achieved.

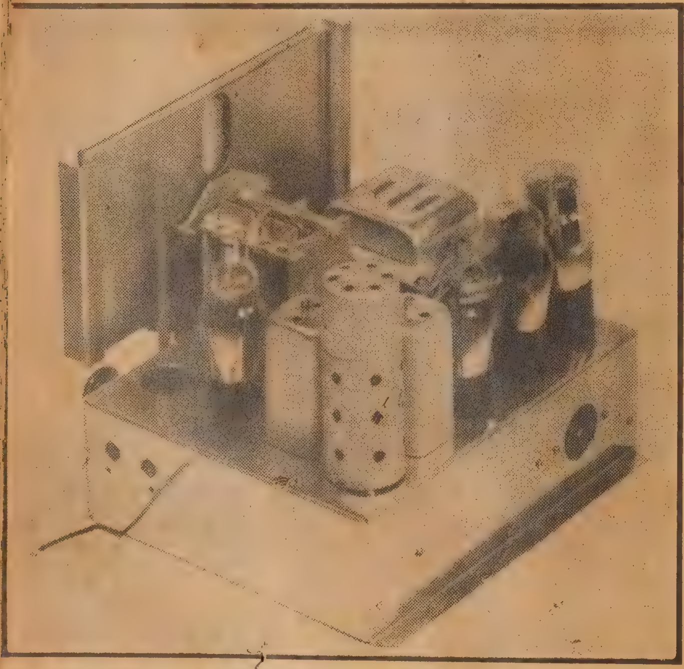
Looked at from this point of view, nothing could have been better.

DUAL-WAVE CIRCUIT

But a dual-waver is generally in a different class. Most people when they spend a little extra money and trouble to make up a dual-wave set, like to regard it as a serious receiver, and house it often in rather a pretentious cabinet.

So we decided that, although cost and simplicity would not be forgotten, we could take a little more trouble, for instance, to remove residual hum, even if it meant a few more parts.

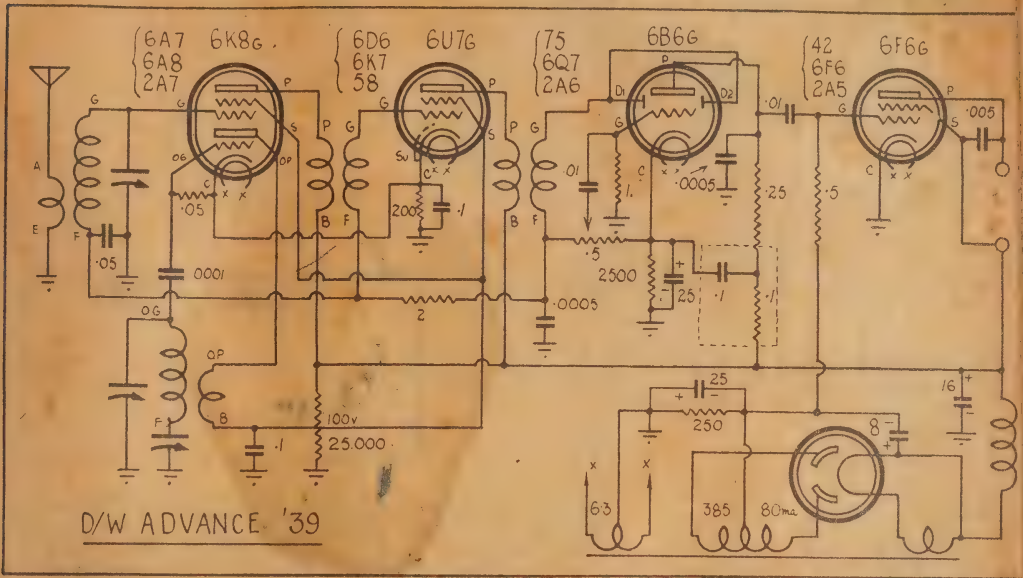
We have rather an objection to receiver hum, even though below the limits generally agreed as satisfactory. If hum isn't very noticeable when there is no music, and quite inaudible even with a low volume programme, most



If you compare this picture with last month's set, you will see that the broadcast tuning coils have been removed. You can see a hole in the chassis where one of them has been. The can cover over the I.F. amplifier is necessary to prevent instability. It is not essential to place cans over the other valves.

DUAL-WAVE RECEIVER

By
John Moyle



Here is the circuit. Note the optional decoupling in the plate circuit of the second detector. When using any converter but the 6K the oscillator plate voltage should be obtained from a tap on the divider at 150 volts. This tapping should be by-passed with a 1 condenser.

Here is a set which has been produced to fill the need for a Standard 4/5 Dual-waver. The use of the latest coils allows a performance not possible in the earlier days of radio. Its simplicity allows it to be operated with almost any suitable types of valves, and we have given four different series which may be used. Results are certain and easy to obtain.

people will think they have gone far enough. But many do not. We could mention a few commercial sets which have lost sales because of this fact.

So we mounted the speaker for our tests on a large baffle, 3ft. 6in. square, and selected a 12in. model speaker, which has a fairly high natural resonance, somewhere near the 50 cycle mark. Then we set out to reduce the hum until under these conditions, we thought we had reached a fair standard.

The original circuit behaved quite well as long as we used an average speaker and a small baffle, as for instance, would be the case in a small mantel set. But with the big speaker, it didn't behave well enough. It wasn't too bad, but just bad enough to want to make things better.

DE-COUPLING

After a good deal of playing about, we found that careful "de-coupling" in the second detector circuit was required to reduce this hum to a low level. It will be remembered that last month's circuit used a very simple and easy way of biassing this valve, and, incidentally, a very high resistance in the grid circuit.

Before any great improvement was noticed, we found it necessary to reduce this resistor to a value so low that "contact potential" method of bias no longer practicable. No matter wl we did, there seemed to be a "touc ness" about the 10 meg. input (as would anticipate) that caused an amo of hum we couldn't get rid of.

PARTS LIST, DUAL-WAVE ADVANCE '39

Chassis, 10 x 8 x 3 inches.
1 Tuning dial—D/W type.
1 D/W coil kit and 2-465kc. intermediates.
1 2-gang condenser to suit dial.
1 Power transformer, 385-0-385 V. at 80 mills, 5 V. and 6.3 V. windings.
1 8 mfds. electrolytic.
1 16 mfds. electrolytic.
1 25 mfds. electrolytic.
1 .5 meg. potentiometer.
2 .1 mfds. tubular condensers.
1 .05 mfds. tubular condenser.
2 .01 mfds. mica condensers.
1 .005 mfds. mica condenser.
2 .0005 mfds. mica condensers.
1 .0001 mfds. mica condenser.
1 2 meg. resistor. 1 1 meg. resistor.
1 .5 meg. resistor. 1 .25 meg. resistor.
1 50,000 ohms resistor.
1 200 ohms W.W. resistor.
1 250 ohms W.W. resistor.
1 25,000 ohms voltage divider.
1 valve can.
Valves—6K8G, 6U7G, 6B6G, 6F6G, 80, or equivalents.
Speaker—2000 ohms F.C.
Sockets—To suit valves.
3 knobs, hookup wire, &c.

LOWER GRID RESISTOR

Reducing this grid resistor to the m usual 1 meg., it became necessary to a definite bias for the second detec

We started off by picking up this b from the back-bias resistor, as we h often done in the past. This worked qu well, but we could still reduce the h by using an extra 25mfds. condenser passing the tap on the main resistor the junction between the 200 and ohms resistors, as we had it.)

In other words, there seemed to no advantage over the standard meth of using a cathode resistor and byp for this valve. If anything, results w a little better with this method.

This then, was our first step, a you will see the circuit in the diagra

Next we tried a decoupler in the pl circuit of the detector. This we fou made more difference in some ca than in others. We tried various val in this socket—old and new. In

AMATEURS-

YOU DON'T NEED A MAGNIFYING GLASS

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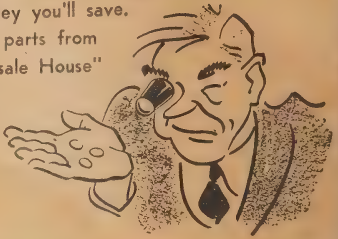
You'll be making sure of the best results, too, because John Martin Pty. Ltd. handle only standard branded lines. Make out a list of the parts you require for the "Dual-wave Advance '39" and "Economy Seven" and write NOW for prices and details.



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For the "DUAL-WAVE ADVANCE '39" specify Electro-Dynamic type
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Rola 8-21 6-inch . 42/6
Rola 8-20 8-inch . 38/-

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Expressly recommended for the Dual-Wave Advance '39 and used by the Technical Editor, here is nothing to equal the Radiokes DAU-1 Dual-Wave Tuner.

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- EASY ASSEMBLY — Just solder the leads and turn lock-nut.
- AMAZINGLY COMPACT.
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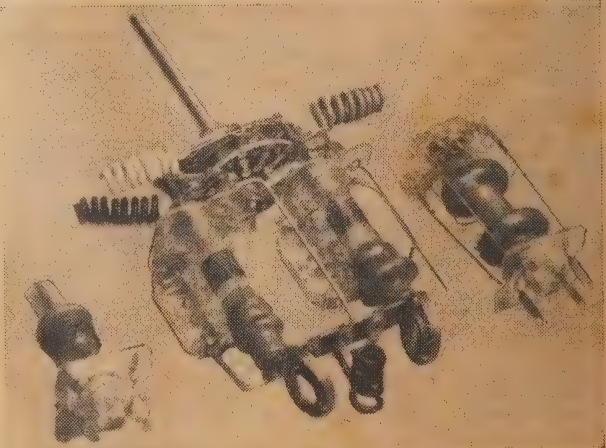

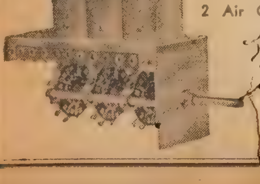

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cases, the set was definitely quieter, but by this time we were getting down to rather a fine degree.

We can well imagine cases where this step would not make any great improvement. So we have marked this part as optional. It is always a good plan to include it, but it is also permissible to leave it out if desired.

THE A.V.C. CIRCUIT

The A.V.C. circuit is so simple and so well-tried, that we decided to leave it "as is" if possible.

An interesting point arises here. When we made the change in the bias of the second detector, we tried out the set with the cathode of the first two valves connected to the chassis. The set behaved well in every respect, and showed no signs of instability.

And yet, according to figures, with no signal, there should be if anything, a positive bias on the controlled grids, because the cathode of the second detector is about three volts positive with respect to the chassis.

NOT WHAT IT SEEMS

Actually of course, this is not always as it seems. If there were no signal at all being fed to the diodes, it would be correct to accept it as being right.

But there is always some signal to be heard. When the set is "flat out" quite a bit of noise will be heard in the speaker, in a manner with which you are familiar. This is quite enough to set up a negative voltage at the business end of the load resistor, which tends to cancel out the standing positive bias placed in effect on the controlled grids.

Were it not for the fact that some of our very strictly theoretical readers might smite us for so doing, we would have left the circuit that way, but we must admit that there might be cases where instability might result in running so close to the "dead-line."

Therefore in the circuit given, we have included a bias resistor for the first two valves, which will prevent the possibility of the controlled grids running positive. This resistor places the two cathodes also positive above chassis, by an amount approximately equal to the bias on the second detector.

200 OHMS BIAS RESISTOR

The value of 200 was selected as being about right, but it could be reduced to about 100 ohms after experiment, if better maximum sensitivity is obtained thereby.

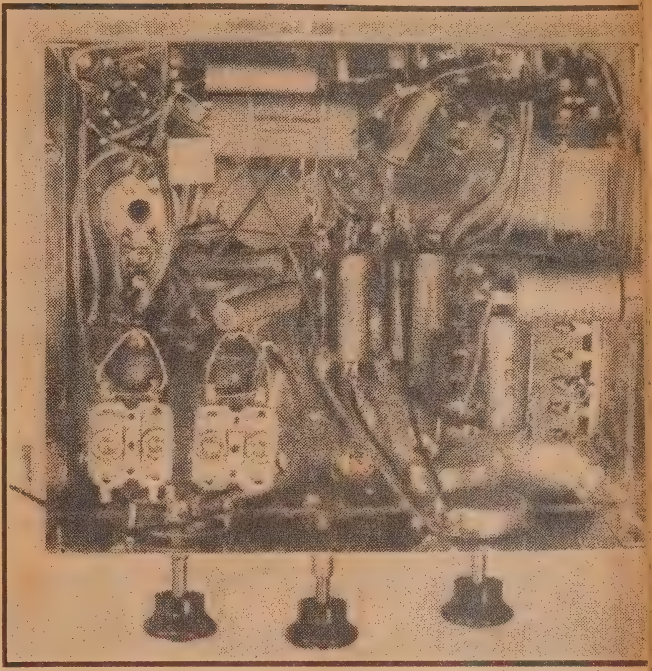
Apart from the use of a 16mfds. electrolytic condenser, after the speaker field, there is no other precaution against hum. The set as shown, with everything on, is particularly quiet, and you will be fussy indeed if you desire greater silence. An extra filter choke in series with the field will no doubt fix things once and for all. Only the cost is against it.

CONVENTIONAL

The circuit as it stands, you will no doubt remark, isn't much different from the sets we built some little time back.

Quite right, it isn't. It bears out what we said last month, that two men trying for the same thing, will probably come to very much the same result. There are other circuits almost exactly the same as this one. But why not? This very fact is your guarantee that there is nothing crazy in it, and that it can be relied on to work well. Isn't that what you want?

UNDER THE BASE



This very clear under-chassis photograph gives a good idea of the general layou Although the converter valve is obscured, there is plenty of room to make the necessa connections to it.

★

A SUITABLE CABINET

This receiver, if used with a high quality loudspeaker, may be housed in a full-sized console cabinet, thus making a fine household receiver. It is, however, small enough to fit into a table model cabinet if this should be desired.

★

The difference is that some time ba you couldn't buy coils and valves as g as those available at the present ti Which brings us to the matter of dual-wave unit.

THE COIL BRACKET

The coil bracket we have used is same one which was developed for famous 4/39.

We have had an opportunity to ch the performance of this bracket several sets, and have also seen results, and read the reports, of ma readers who have used it.

These reports indicate that it is thoroughly reliable and satisfactory u Our own results with it have excee our hopes, and we have no hesitation recommending it as one of the best have used to date.

The makers advertise that it is suita for any of the well-known conver valves. Ideally, each of these needs special oscillator coil for best resu But there is enough margin in the g current requirements of each (the i portant thing in this regard) to all, a compromise to be found to satisfy th all.

We have tried the kit with eve thing from a 2A7 to a 6K8, and ha found it to work immediately and w with them all.

—Yours to Command!

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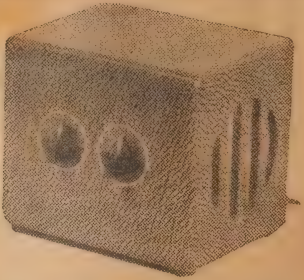
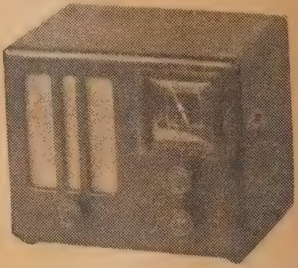


TINY TIM featured in previous issue of R. and H., and a very popular circuit—easy to build.



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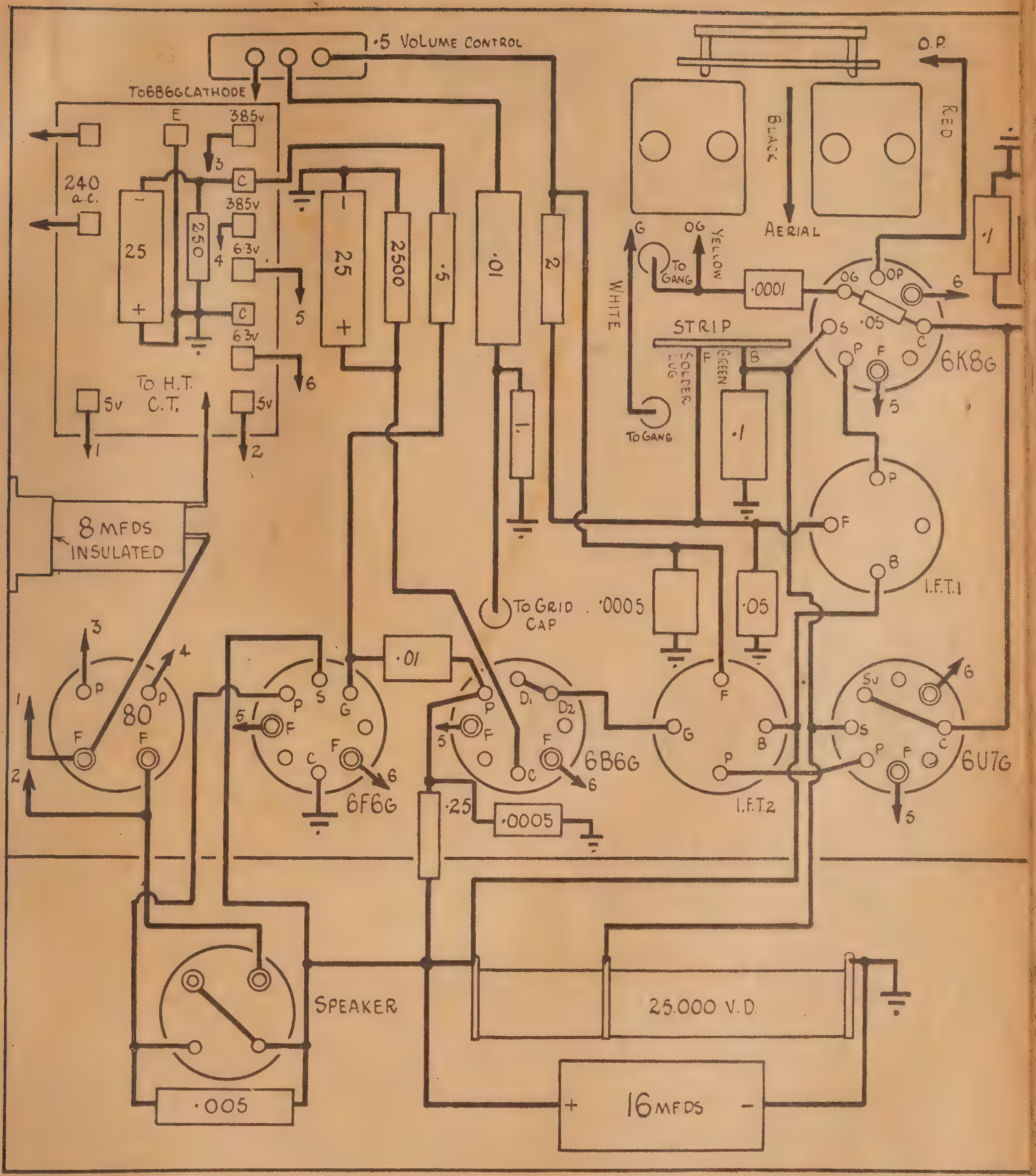
·5 VOLUME CONTROL
TO 6B6G CATHODE
E
385v
3
240 a.c.
C
385v
25
250
4
6·3v
5
C
6·3v
6
TO H.T. C.T.
5v
5v
1
2
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2500
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TO GRID CAP
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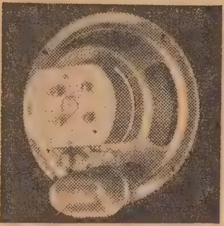
5

Here is the wiring diagram. Note that the full outline of the coil assembly has not been drawn, as it would then have been impossible to show the wiring to the converter valve socket. Actually, the two coils project well out into the chassis. We have indicated the little terminal strip at the rear of the coil bracket. Although for clarity's sake, we have omitted to show the two lengths of copper braid which are connected to the chassis. The leads from the coil unit are marked by their symbols and their color code. Compare this with the illustration of the unit later on in this article. The group of components at the side of the power transformer will be seen in this under-chassis photograph as being in the centre of the chassis. To save unnecessary wiring on the diagram, we have numbered the connections for filaments, etc., and their points of connection are also shown on the diagram.

THE WAY TO BUY A



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So we can only say that we know of no reason why you should not be able to do exactly the same.

SMALL AND COMPACT

The unit is quite a small affair, and it fits into our last month's chassis with the greatest of ease.

In this position, it obscures the converter valve socket, but this doesn't matter—there is plenty of room to get your soldering iron underneath to make connection to the oscillator solder lugs (grid and plate).

In order to assist you in getting the connections correctly, we have photographed the unit, and prepared an illustration giving both the color code and the lettered indication for connection, to correspond with the diagrams.

In our photograph, you can also see the lugs to which the dial light connections can be made, if you wish to use a dial which changes color with the tuning band.

We might mention here that the unit is available both in R.C.E. and Radiokes brands, and the same color-code is used for them both.

An interesting feature about the kit is that no trimmer is used for the oscillator grid circuit. It is possible to match this coil at the factory with sufficient accuracy to make such a trimmer unnecessary. In a simple set such as this one, the aerial trimmer is not very sharp in its setting, and we did not find the lack of it a disadvantage.

The trimmers are carried on Isolantite bases, one of which carries the padding condenser for the broadcast band. Thus all adjustments are easily and quickly made.

A.V.C. CONNECTION

When you get your unit, you will find an insulated strip at the rear, which carries among other things, two solder lugs connected together with a piece of tinned wire. These will be at the left of the strip, looking down on the kit from under the chassis.

The one nearest the centre is the grid straight to the earth lug beside it. In order to make the A.V.C. connection effective, you must remove this piece of wire, either with your soldering iron, or by cutting it away.

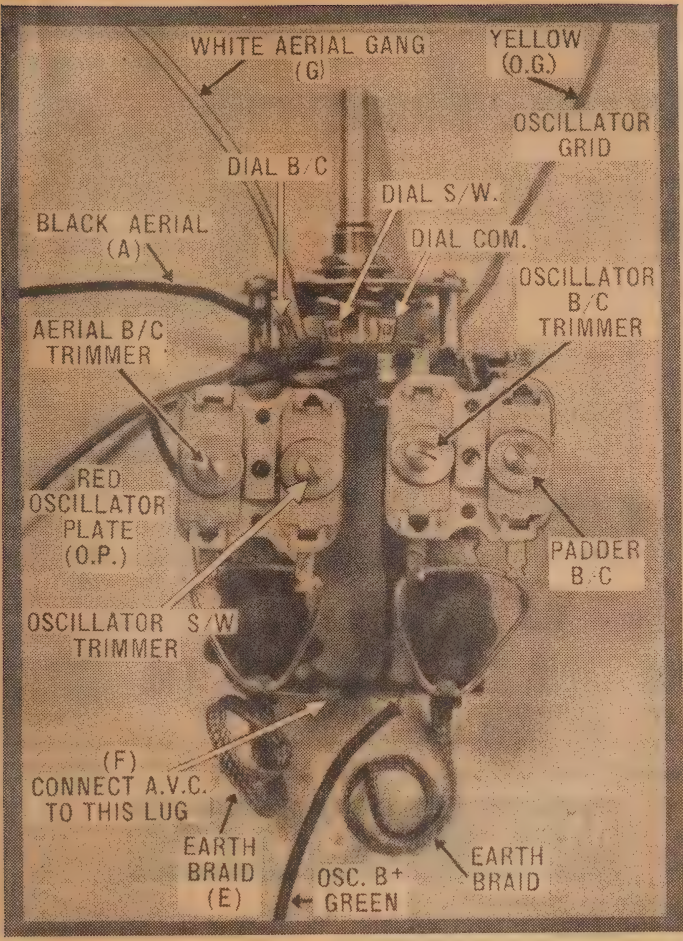
The A.V.C. can now be soldered to this lug, and all will be well.

At the rear of the unit, you will see two pieces of copper braid, which are to be connected to the chassis. The makers recommend that these chassis connections be made to two different spots. They find the unit works best that way. Actually, we couldn't tell any difference, but it's as well to follow instructions, isn't it?

The intermediates are of the standard type—ours were wound on Trolitul. They were the same pair as were used in the original Advance of last month.

COMPONENTS

In fact, all the components were the same as for last month's set. A rearrangement of the terminal strip in the centre of the chassis is required, but this is clearly set out in the wiring diagram, and shouldn't give you any trouble.



Here is a photograph of the coil bracket, which shows clearly the connections, and also the adjusting trimmers. Being marked in color code, as well as by appropriate lettering, no one should have the slightest trouble in correctly connecting it. The lugs for the dial light connection are correctly shown, should these be required. The lugs are easily reached when the bracket is in position.

The power transformer is a standard 80 mills type. All the resistors may be of the ½ watt type, although 1 watt resistors are just as suitable. We used some of both. Standard tubular condensers are used, and the .5 meg. volume control is the ordinary carbon type.

To save space, we again used the small electrolytics of the tubular variety, although the wet can type may be mounted in standard fashion on the chassis if you prefer them. Remember that one is insulated from the chassis itself.

VALVES

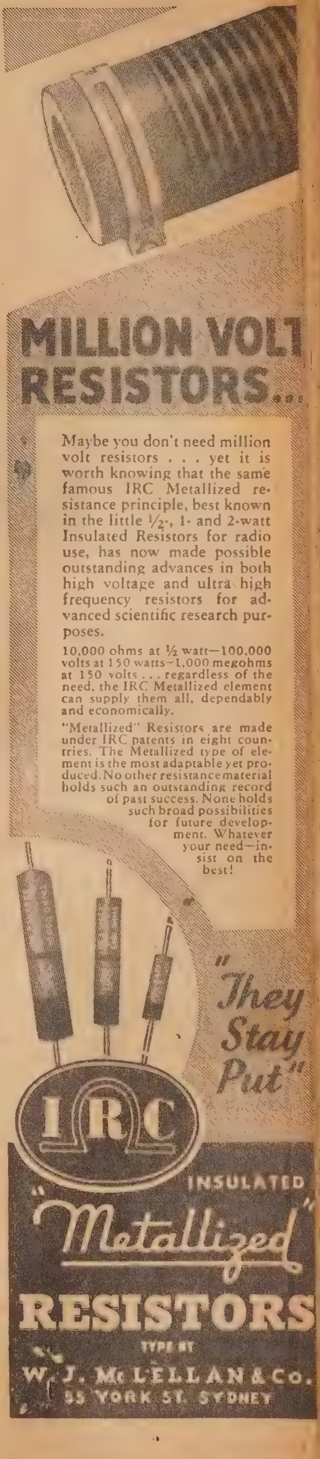
On the circuit diagram, we have shown four different valve combinations which can be used. One includes the 2.5 volt types, another metal valves, a third the old standard 6 volters, and a fourth, the newer G series. Results should be the same with any of these. A fifth series of valves could be used, namely, those with the .15 amp filaments, but there are not many of these valves in circulation.

The only point to watch, is that the oscillator plate and screen of the 6K8G are connected to 100 volts on the voltage divider, while the others require 150 volts for the oscillator plate.

In this latter case, another tapping on the divider is made use of and this should be by-passed with a .1mfds. tubular condenser. Sometimes an 8 mfds. condenser is used as well, should short wave instability be experienced.

Otherwise, values remain unaltered for any combination.

This ability to "work with anything" is a big feature of this receiver, and the original was built up with a mixture of them all. We have tried all the alternatives we could find in the set, and results have been the same in every case.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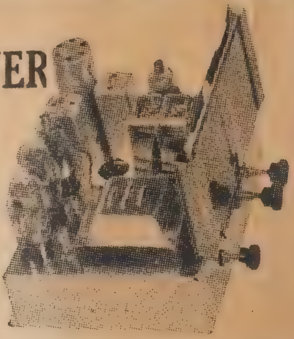

FOR A.C. MAINS

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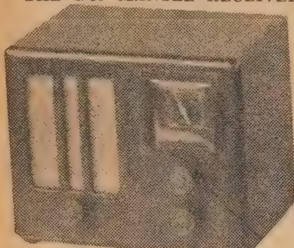

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CHASSIS 14 x 10 x 3½ inches
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"THE TINY TIM."
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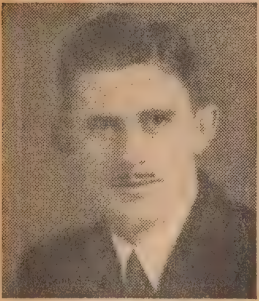

R. T. Andrew, M.I.P.R.E.

NEW MANAGEMENT

The Australian School of Radio Engineering has been taken over once again by Mr. R. T. Andrew, M.I.P.R.E., Assoc. I.W.T. (London). Early this year he gave up all connections with the A.S. of R.E., but we are pleased to announce that he has seen his way clear to take over complete control again, and we look forward to a sound future policy similar to that carried out by Mr. Andrew during his nine years as Principal of this School.

A. S. of R. E.

MEN WANTED

A. S. of R. E.

Never since the depression has the Radio Trade been so active, especially in the matter of SERVICE ENGINEERING. Thousands of new sets are being sold and many others require repairs and service. Everyone wants the latest news on the Overseas Doings and naturally to get this, their radio sets must be in first-class order. This hue and cry for repairs and service has been too much for normal channels of service work, with the result that now there are many

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Est. 1930 *R.H., 11.10.39*

ADJUSTMENT

Assuming the set to be correctly built, it will be necessary to line it up.

Switch it on, and in the broadcast position, tune in a station at the lower end of the dial—say 2SM. You may be lucky in finding the station pretty well in place. If not, see that the padder is slackened off about three turns, and adjust the oscillator or trimmer until 2SM coincides with its dial marking. Now adjust the aerial trimmer for best volume.

Now jump up to 2FC or some other station near it, and without altering the trimmers, adjust the padder until the dial markings again coincide. At this setting you should also hear the station at best volume.

Go back again to the bottom of the dial, and readjust the trimmers if necessary, for best results. You should now have the set pretty right on this band.

On short waves, nothing could be easier. You have only one trimmer—the oscillator trimmer, and this is adjusted to bring in the lowest band—16 metres, at the spot marked thus on the dial. The set should maintain its trim quite well all over the dial.

AERIAL

The aerial requirements for the Dualwave Advance are much the same as those for any other set.

Its sensitivity is quite high, and, therefore, it should do quite well with an indoor aerial. In fact, you will probably find that a good indoor aerial will be just as effective on short waves as an outdoor one, unless the latter is a particularly good one.

But here again the old rule holds good—if you want distance on the broadcast band, the outdoor aerial should always be used. You stand a better chance of getting clearer and stronger signals.

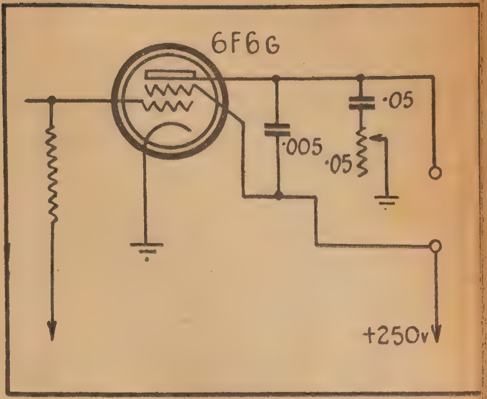
The set can be used with a pick-up just as could the broadcast version last month. The connection of the pick-up will be very much the same. In this regard, its performance will be no better or worse than last month's receiver.

It is not essential to provide an earth wire, although we always advise this in the interests of safety. Performance, however, should not be affected very much one way or the other, except in a few isolated cases.

By the way, a few letters recently indicate that home-builders often have a mixture of 6.3 volt and 2.5 volt valves, and are wondering if they can be used in the same receiver.

It is quite permissible to use either 6.3 or 2.5 volt valves in a set, as long as the respective types are suitable for the sockets in which they are used, and the power transformer has both 6.3 volt and 2.5 volt windings.

In this set, as with the broadcast version, it would be quite permissible to use, say, a 2A5 output valve, running from a 2.5 volt winding, and the other all 6.3 volt types. So don't throw away a perfectly good valve if you can get a transformer with the right filaments. In any case, it isn't a bad thing to have round the house, if you change your set about from time to time.

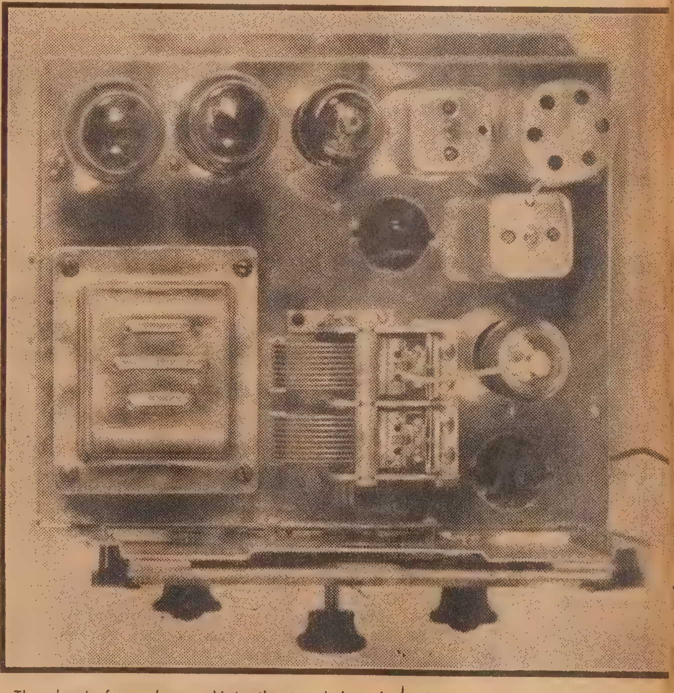


This diagram shows how the tone control is connected, if you feel like using one.

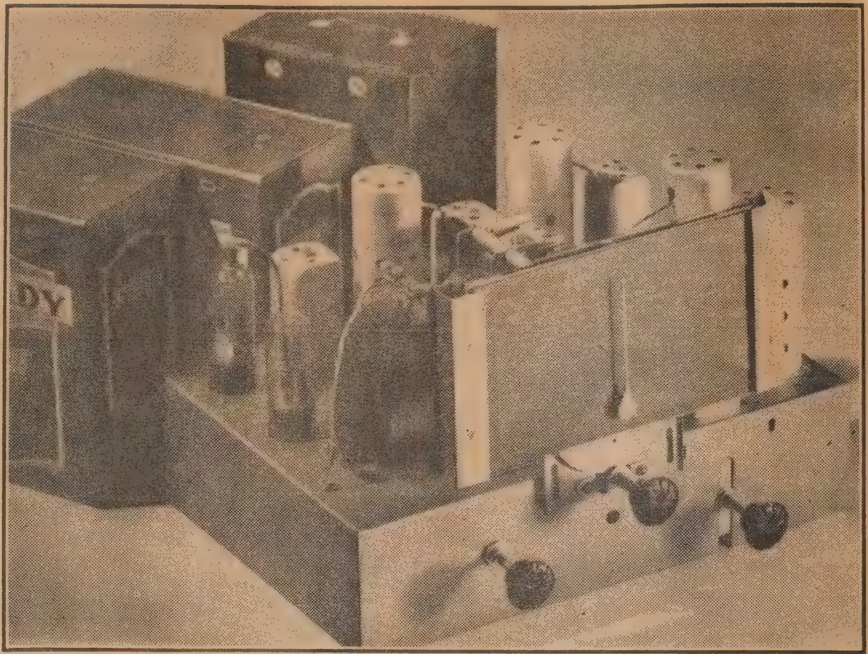
TUNING DIAL

Incidentally, if you decide to house this set in a small cabinet, there is no need to keep to a dial as large as the one shown in the photographs. The small type with a square face, known as the AJ11, which we used in the Portable, and also in the 4/39, could be used instead. This seems a small point, but only the other day, we had a ring from the makers of these dials, asking for the exact type number of one used in an early set. The builder evidently thought that only this dial could be us and was in a great state because it ha pened now to be out of print, or wha ever dials do when supplanted by new types!

The layout could also be changed sligh ly to make the chassis smaller, if t set is required for a "midget." As lo as the same relative positions are mai tained, this will not affect the operati of the receiver. The only result w be to bring the wiring a little clos together, and perhaps a little "wanglin of resistors and condensers.



The chassis from above. Note the two holes where the original coils were mounted. The only above-chassis connections are the lead from the converter grid to the condenser gang, and from the I.F.T. to the I.F. grid cap.



Here is the set with its quota of batteries in the background.

THE ECONOMY SEVEN

A new receiver incorporating for the first time, the new "B" class output valve of the 1.4 volt type. Definitely an economy receiver, it has nevertheless an excellent all-round performance particularly when its low battery drain is considered.

It is only about twelve months since the first of the 1.4 volt valves were announced in America. Since then, they have appeared in Australia and have found their way into quite a number of receivers.

The immediate application of these valves has been in portable receivers. Naturally this was to have been expected.

In the first place, they allow of filament operation from a single dry cell, and for portable use, quite a small one at that. For the first time accumulators are not required in portables, and as a result the sale of such sets has boomed.

In addition, 90 volts of B battery has reduced size and weight of the power supply still further. From this point, it only required some work to reduce the size of the sets as much as possible, and the portable receiver is given a real and worthwhile basis for establishment.

But still they come! Valves have been announced since the first types were released, which allow us to do much more with them. As time goes on, they will be found in all kinds of standard sets, and others which would not be possible but for some of the types we have seen, and will see.

For instance, the combination diode-triode-pentode has reduced the second detector and output valve to one instead of two. It is bound to be seen in many small sets before very long.

B CLASS VALVE

There is one valve, however, which so far we have not seen used, although no doubt it is only a matter of time before it also is forced into line.

This is the B class output valve, similar in general to the 19 type, which has been used frequently in big receivers.

The advantage of such a valve is that it allows a much higher output for the same consumption than would a single pentode, for instance.

The standard output valve in the 1.4 volt line is the 1C5G. This valve has a maximum output of 240 milliwatts for a drain of about 9 mills at 90 volts. A steady 9 mills, whether signals are being received or not, whether they are loud or soft.

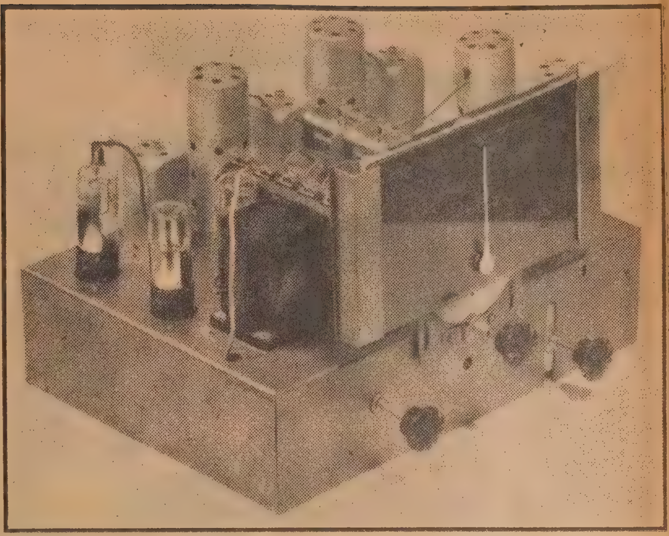
This isn't a big wattage, one must admit, and represents excellent efficiency.

But the B class valve, because of its different operation, draws plate current (except for a small standing current) only when the signals are

"B" CLASS BATTERY SET

being heard. More than this, it draws current in proportion to the strength of the signals. No signal, very low current. High volume, high current.

In other words, if we are desirous of very low volume, as we often are, the set, as far as the output stage is concerned, draws about 3 or 4 mills. This current is not increased unless we turn up the volume, or unless an extra loud signal comes through. Then it jumps up with the signal, to fall back immediately the signal itself drops to a low value.



A general view of the chassis showing the audio end. A first class audio transformer is essential for best results. Note the lead to the "C" battery.

HIGHER OUTPUT

This is not the only advantage possessed by the B class valve. At its maximum output, it can deliver much more volume than could the single pentode.

The figures show that when fully driven nearly 700 milliwatts of output are available on peaks. This is about three times as much as the single pentode will give.

Yes, there is a catch somewhere! When giving this high output, the plate current will jump up to instantaneous values a good deal higher than those required for the pentode.

But these higher currents are only drawn for small periods, unless the set is allowed to blare out undisturbed for hours. The average value of plate current will be something like one-third of the maximum, which is well below the 9 mills of the pentode—a steady drain.

In other words, a larger set using a B class valve, will not only draw less on the average than one using a pentode, but it will also give more maximum output when it is required.

MORE DRIVE REQUIRED

The advantage of the pentode is that its grid voltage drive is lower than the B class valve, as would be expected.

A grid swing of 7.5 volts is required by the pentode for 240 milliwatts. But for 675 milliwatts from the B class valve, 18 volts are required from plate to plate.

At the same time, remember that for output equivalent to the pentode the drive would be much less, and would probably average out about the same.

However, the net result is that we must provide a driver valve for the B class stage, which the pentode does not require. This is a characteristic common to all such B class valves.

TRIODE DRIVER

Another new 1.4 volt type has been developed for use in such a driver stage. Its type number is 1G4G. It has an amplification factor of about 8, and requires a negative bias of 6 volts. Its plate current is quite low—2.3 mills, and it is capable of driving the output stage to full capacity.

While passing, we might mention some possibilities with the 1.4 volt valves which the experimenter might try some time.

This new diode-triode-pentode might well be used as a diode detector, triode amplifier, and with the pentode connected as a triode, as a B class driver valve as well.

This would avoid the necessity for the 1G4G altogether, and the resul should be about the same.

However, this set of ours, describ in these pages, was intended to be perfectly standard affair, and so v have kept to established practice this matter. Schemes such as this or require a little proving and experimen before they can definitely be recommended, and we will leave this one a least until another time.

PARTS LIST

1 Chassis, 14 x 10 x 3½.
1 Dual-wave tuning box.
3 Intermediates, 465kc., low gain.
1 3-gang tuning condenser.
1 suitable tuning dial.
1 "B" class audio transformer.
1 .5 mfds. tubular condenser.
3 .05 tubular condensers.
1 .1 mfds. tubular condensers.
2 .01 mfds. mica condensers.
2 .0005 mfds. mica condensers.
1 .0001 mfds. mica condensers.
3 1 meg. resistor.
1 .25 meg. resistor.
1 .2 meg. resistor.
1 70,000 ohms resistor.
2 .1 meg. resistors.
1 .5 meg potentiometer.
Valves—3 1N5G, 1 1A7G, 1 1H5G, 1 1G4G, 1 1G6G.
Batteries—1 1.4 volts A cell, 2 45-volt triple duty "B" batteries, 6v-volt "C" battery.
Speaker—Permagnetic matched to output valve.

THE ECONOMY SEVEN

However, at this stage, let us sa something about the set described her

We have called it the ECONOM SEVEN, because it has been designe to give its high-power results with th greatest possible economy.

At the present time, it is hard t see how a B class seven-valver coul be built to give the same results wit the same battery consumption.

We have designed it for long-distanc reception under all conditions, nigh and day, and at the same time, to hav that extra bit of output which so man people enjoy with a "big" set.

It is not as good a set as the bi Stereoscopic Seven, because this on had everything you could get from battery set. But it comes at the head o the list, where 1.4 volt types are concerned, and at the moment we don think you can buy one like it. We a least, have not yet seen one, althoug sooner or later such sets will be mad available.

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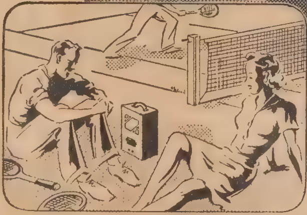

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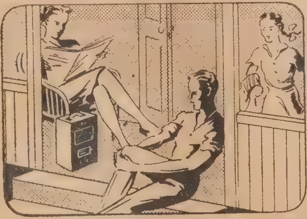

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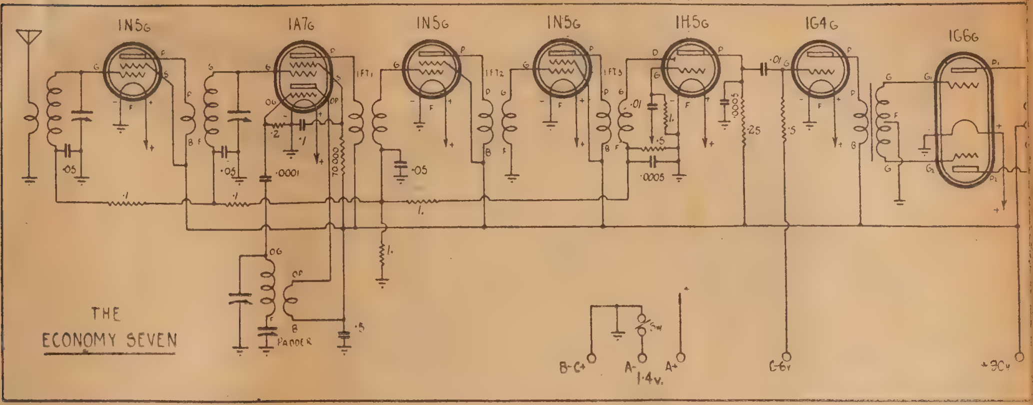
☆ THE ECONOMY CIRCUIT ☆



The circuit follows on our usual lines of combining simplicity with efficiency. Note the A.V.C. connection employed to avoid overloading on strong signals.

PERFORMANCE

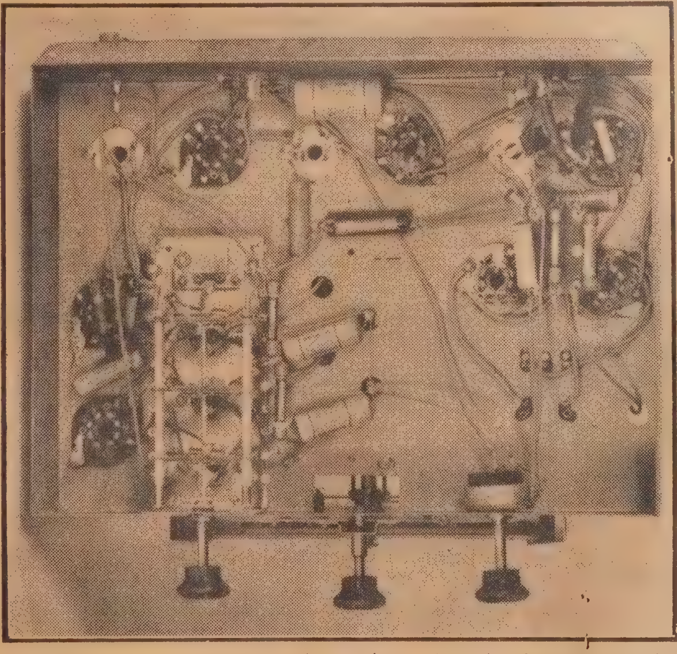
In sensitivity and selectivity, it is a grand performer.

This is due, first of all, to the R.F. stage, which is used, and also to the two intermediate stages. These more than make up for any drop in gain due to the valves themselves, and add a selectivity which a single stage cannot readily give. Both are important in a good battery set.

Secondly, it uses a dual-wave tuner. It is true that some doubt has been expressed as to the efficiency of the 1.4 volt converter on short waves. This doubt is to a certain extent justified, but latest coil design has very largely overcome this difficulty. It is significant that the Economy Six—our first dual-waver with 1.4 volt valves—has proved a consistent seller, and a good performer. If builders of the Six can make the set "gee" on shorts there is no reason why anyone else should not do the same.

We have had this receiver carefully checked up by the coil makers in this regard, and they are confident that the new coil assemblies will be perfectly satisfactory on both bands with the 1A7G. More than that we cannot say. If a man backs his product in this manner that should be sufficient.

The output of the set, as we have said, is much higher than any other 1.4 volt type, and the tone should be correspondingly good.



A picture taken showing the parts under the chassis. Note that the wiring is simple and the parts required are few.

BATTERY CONSUMPTION

The drain on the batteries, of cour is a very keen point with count people. Here, again, the set shows very well.

In the first place, a 1.4 volt c battery is all that is required, and f economy sake we suggest the lar special cells which are made for th type of set.

The total dra of the seven valv is .4 amps. Th represents a to wattage of watts.

Compare th with an average valve set using volt valves. Th would be about amps at 2 volts, .96 watts. T most economic 4-valve set we cou build for dua waves would ne .3 amps at 2 vol or .6 watts. And big seven-valv with everything would call for less than about watts.

So you see, com pared with oth receivers o "Economy Seve deserves its name

The B batteri also have quite a easy time of Only 90 volts a required, and th drain should va between about mills and 15 mil according to vo ume. No one ca accuse this set

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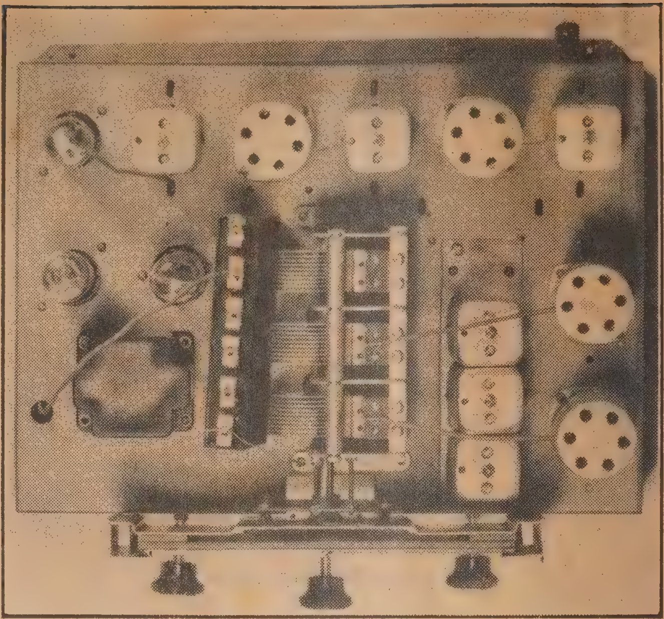

This plan view shows the connections above the base. The positive terminal of the 6-volt "C" battery is connected to a solder lug bolted to the gang. Note leads from the first two valves across to the gang.

being a battery eater. When "ticking over" on average volume, it should not draw more than the ordinary four-valver, if as much, on a good signal.

At the same time, we still advise the purchase of the triple duty B batteries, of the SUPERDYNE type. These cost more than the heavy duty type, but there is much more life in them than the extra cost would indicate. The maximum value for money is always obtained when using the biggest batteries you can get, particularly on a set which can make the most of them.

CIRCUIT POINTS

One very convenient thing about these 1.4 volt valves is that both plate and screens require the same—90 volts maximum.

Therefore, we don't have to bother about a special tapping, or dropping resistors for the screens.

You will find this very convenient when wiring up the set, too, as the screens may all be connected to the nearest point connected to the full high tension. This makes for quick and simple wiring.

The only exception is the screen of the 1A7G. This requires a lower voltage, and this is generally obtained by running it to high tension through a dropping resistor of 70,000 ohms.

We said the SCREEN of the valve, and not the oscillator plate. We confess that when wiring up the set we made this simple mistake, and wondered why on earth the thing wouldn't work. It's bad medicine, by the way, to run a converter this way, and it won't do it any good if you should make this mistake and leave it turned on for an hour or so while you hunt the trouble. So be sure rather than sorry.

Another point we would mention concerns the grid leak for the converter. This is 200,000 ohms, and not the usual 50,000 ohms.

Some builders of the R. and H. Portable thought we had made a mistake here and tried using 20,000 ohms. But the right value is 200,000, or .2 megs to write it another way.

BIAS VOLTAGES

The only valve in the set which requires bias is the driver. This calls for a 6-volt battery.

The B class valve works on zero bias, and the 1H5G does the same. This simplifies the bias connection, there being only one lead to connect.

We thought over means of using automatic bias for this one valve, but there is no way out except dropping the 6 volts from total high tension. Reducing voltage from 90 to 82 volts seriously reduced maximum performance, however, and when the batteries begin to drop this becomes a matter to be considered. So we left the bias battery in the picture, and, after all, it isn't one to give much trouble. Cheap, too, so that you can renew it each time a new set of batteries is required.

THE A.V.C. CIRCUIT

There being only one diode in the 1H5G, this must also be used for the A.V.C. voltage.

The simplest way is to hitch the A.V.C. line direct to the "hot" end of the diode load resistor, which is also the volume control. In most cases this will work quite well.

However, the 1N5G is not a full remote cut-off valve, and it may be that the full A.V.C. voltage will be too much on very strong signal, resulting in distortion.

Therefore, we often see a couple of resistors forming a voltage dividing network between the diode load and the chassis, with the A.V.C. connected to the junction between them. You will remember that the Portable set used this connection.

In this case, it may not be so necessary, as there are three valves being controlled. However, here is a point which can be well used as a matter for experiment. A couple of 5 meg. resistors, wired as described, would probably be satisfactory.

You will notice that the second I.F. valve is not controlled. On a strong signal, it is possible that this valve might be cut back too far to handle much of a signal. It is, therefore, standard practice nowadays to leave it off the A.V.C. line altogether.

COIL ASSEMBLY

You will notice that the coil assembly is a very easy one to wire up. All the connections for it are made to two terminal strips—one down each side of the unit.

These are color-coded, and our diagram makes mistake impossible.

The broadcast padding condenser is mounted at the rear, so by drilling a hole in the chassis just above the adjustment for it you can do all your lining-up from above the chassis.

All the components are standard, and you should have no trouble in obtaining them. All the resistors may be of the ½-watt type if you like, and their small size might be a help. However, this doesn't matter very much.

The volume control is of the type which combines the control with a switch as well.

The only reason for this is that of convenience. A separate switch could be used if desired. However, if you want an extra switch, why not use it to connect in dial lights, to be switched on only when tuning? There is a section on the front end of the coil box switch which will allow you to do this.

Watch that you get low-consumption bulbs, however, as these lights represent a drain on the battery which takes off from its life—probably a few hours in the total of several hundred.

A standard B class transformer will be found to work satisfactorily. As a matter of fact, the chassis we used is the same one as housed the Stereoscopic Seven, and most of the parts are the same.

VALVES

The valves are obtainable in several makes, and are as follows:—Three 1N5G's for the R.F. amplifier, and the two intermediate stage, one 1A7G as the converter, a 1H5G as diode detector and audio amplifier, a 1G4G as the audio driver, and a 1G6G as the B class output valve.

All these valves use Octal sockets. The first four valves should have cans fitted. This is a very impo point, as otherwise the very high of the set might easily set up i bility. Don't even try to work th on a trial run without the can it will probably run berserk wi them.

B CLASS TRANSFORMER

One point we would make in tion to the "B" class transformer in this set. It will be realised that v ultra-economy such as it can off concerned, we haven't tremendous gins to work to. Consequently, the class transformer should be the very that you can obtain.

A "B" class output valve requires than voltage to drive it—power is r ed as well. This is so because the a flow of grid current in the transfo secondary, and grid power is req as well as voltage swing.

A poor transformer can easily s from enough losses that most of driving power is taken in overco these losses, thus leaving less for output valve itself.

In the case of a 2-volt set, the more power reserve in the driver, this problem is not so acute.

However, we have checked up fully on this matter, and provided the transformer is a good one, ev

COLOR CODE FOR UNIT

The coil unit is color-coded for connection. The wiring diagram shows how all connections are made. The connections on the strip nearest the valve, and read from the front, are—Green, Aerial. Blue and Pink, dial lights. Black, common c nection for dial lights. Red, R.F. valve plate. Green, B plus, 90 volts. Yell Oscillator Grid. Red, Oscillator plate. Green, Oscillator B plus (90 volts). L connection blank. On the opposite strip, from the front, connections are—Black, Ear Yellow, R.F. gang. Blue, F. of Aerial Secondary. Black, Earth. Yellow, Conver section of the gang. Blue, F. of R.F. Coil secondary. Black, Earth. Yellow, Oscilla section of the gang. Last two connections are blank.

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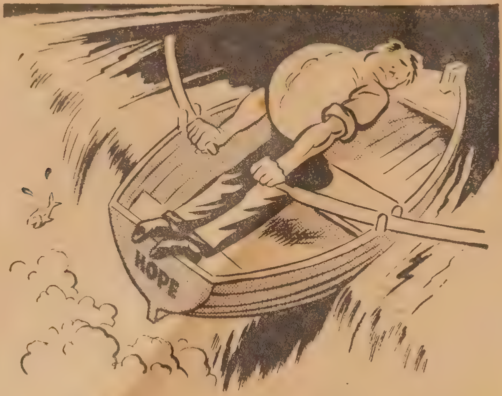

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thing should be in order. A bad transformer will result in lack of full output, and distortion when the volume is turned up to the full, although on lower levels, everything will be in order.

There are two or three very fine transformer available on the market at the present time, and we strongly advise that you buy the very best you can. It is, of course, quite possible to overload the output valve anyhow, when the gain is turned flat out, but this overload point should not be reached until ample volume and tone are achieved.

In passing, we might mention that at no time must more than 90 volts be applied to the set, even if you have the necessary batteries lying handy. If you over-run the valves in this way, they will possibly lose emission very quickly. If you can't get all you want with 90 volts, the trouble is not with the battery supply, but somewhere in the set itself.

The use of fairly long filament leads for this set is another good point, as when the A battery is new, it might be slightly above the maximum voltage allowable. Four or five feet of hook-up wire will provide something like the fraction of an ohm resistance needed to prevent filament failure when the batteries are fresh.

WIRING AND CONNECTING

Having made sure all your connections are right, and everything is in place, check them once again to make sure.

Now connect up the A battery and switch the set on. Your job is to see that the filaments are alight before going any further.

If they are, obviously you can't now connect the filament leads to the B battery by mistake and blow out the valves! A simple tip, but a very good one.

Before connecting up the B batteries, wire a pea-lamp globe in series with the B minus lead. This is another precaution which might save your valves in case of accidents.

However, we will assume that all is well and you actually hear signals on the broadcast band.

Tune to a station about 2SM, with the padder unscrewed about three turns.

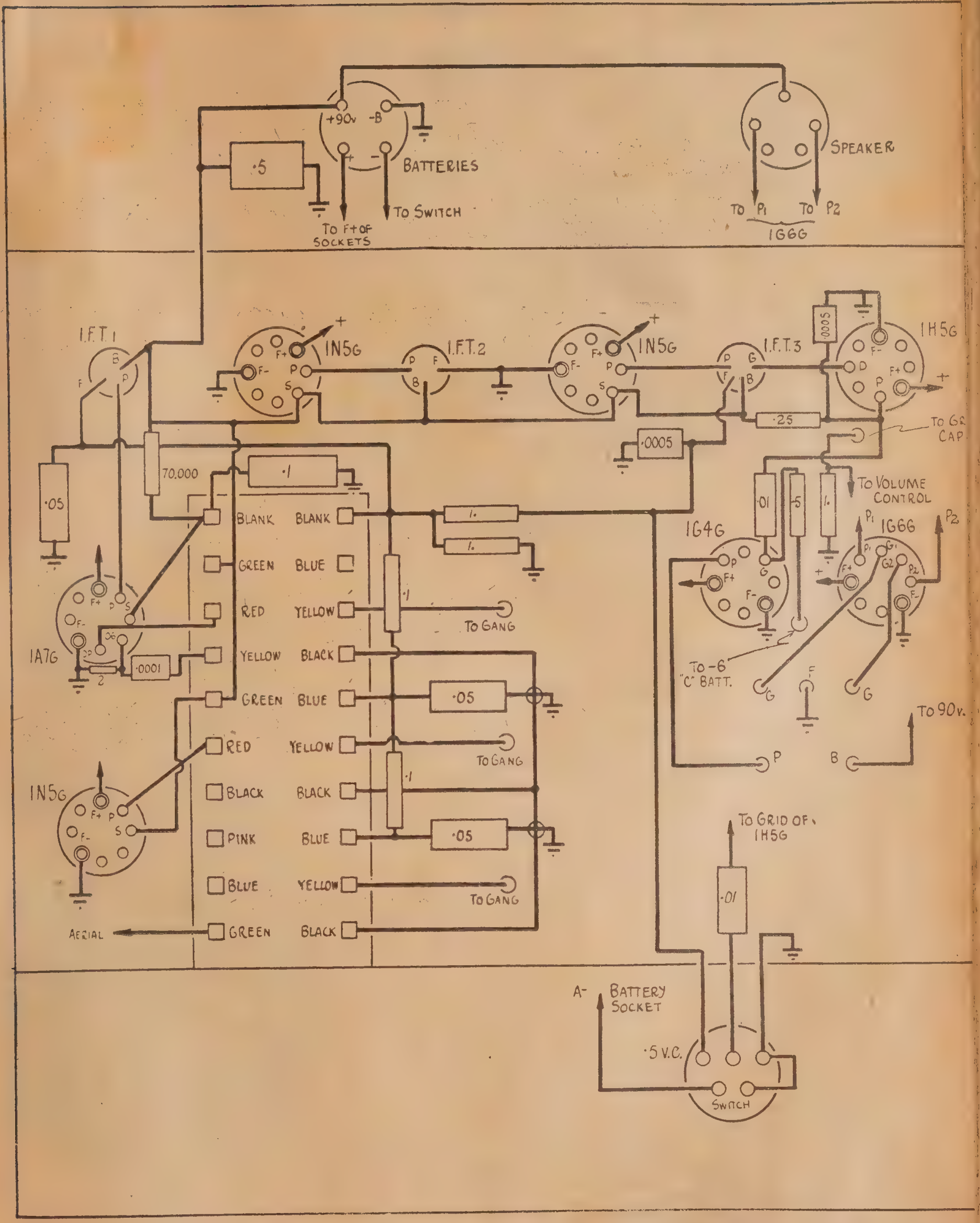
Now adjust the oscillator trimmer so that this station corresponds with the right dial marking. The aerial and R.F. trimmers are now lined until volume is best.

Running now to the other end of the dial, leave the trimmers severely alone and adjust the padder to bring these stations opposite their right marks. You will probably find this adjustment is the same as the one required for best volume.

Now go back to the first position and, selecting a weaker station, make a final check on the trimmers.

The short waves are lined up the same way, except that there is no padder to worry about. It is already included in the kit, and is fixed in value. The oscillator trimmer will bring the stations to their right channel on the dial, and the aerial and R.F. trimmers will give you the best volume.

WIRING DIAGRAM


+90v
-B
+
-
BATTERIES
·5
TO F+ OF SOCKETS
TO SWITCH
SPEAKER
TO P1
TO P2
1G6G
I.F.T.1
B
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IN5G
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TO -6 "C" BATT.
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TO 90v.
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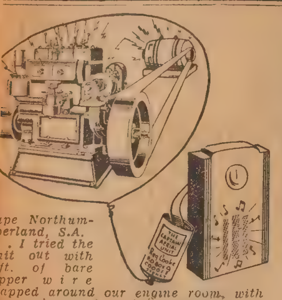
·0001
2
IN5G
F+
P
F-
S
AERIAL
TO GRID OF 1H5G
·01
A-
BATTERY SOCKET
·5 V.C.
SWITCH

Here is the wiring diagram of the battery set. On another page appears a further note on the color-co connections. The components may be grouped as shown here. The A.V.C. decouplers are mounted direct t the solder lugs on the coil unit. The two 1 meg resistors should be supported on a small panel, similar moun ing being used for the group at top right.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A MARVELLOUS NEW VALVE MORE ABOUT THE 1D8-GT

Of all the valves released in the last few months, none is more interesting than the 1D8-GT. This is really three valves in one envelope, and with it we are able to do things previously not possible. For the experimenter, it represents a happy hunting ground.

The new valve is shown here in our photograph, in which we have tried to make visible the various sections. This, however, is not very easy, as photographing through the glass envelope presents many difficulties.

However, just behind the name of the valve printed on the glass, you will see a rectangular, hood-like structure. This is the shield for the diode section of the valve.

Immediately above it, and served by the same filament, is the triode section. You can quite clearly see its cylindrical plate among the mica sheets which bond the valve together.,

Right at the rear, is the pentode output section. It is hard to see very much of this section, although just below the grid cap, you can pick out a few turns of the grid of the pentode. From this, you will be able to see the general outline of the plate.

Incidentally, this picture is about twice the actual size of the valve itself. From the chassis level to the top of the grid cap, the valve measured just a trifle over 2½ inches.

SMALL ENVELOPE

The letters "G.T." after the type number indicate that it is of the new Bantam shape. These bantam valves are produced with the object of conserving space, and on the theory that a valve needn't be any larger than it must.

The valve has an octal base, and the connections for it are shown on the opposite page.

APPLICATIONS

The immediate application of the valve is, of course, in a portable receiver.

Here it will do the work of two valves used at present—the 1H5G and the 1C5G.

The former is a diode-triode valve used in the second detector socket and the latter, an output pentode used in the final stage.

Thus, with this single valve, we can make what was formerly a four-valve set into a three-valver.

A three-valve portable receiver is on the way at the moment, and we hope to describe it in "RADIO AND HOBBIES" at an early date.

SMALL SETS

A DUPLEX SINGLE using this valve looks to be a great idea. The triode section would be employed as a regenerative detector, and the pentode section for the output.

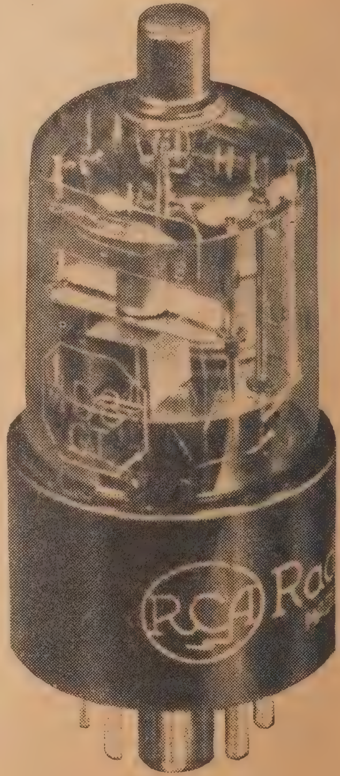
This would give plenty of gain, and much more output than was possible from the original. The "B" battery consumption would be higher, of course, but then you would get quite good results from a speaker.

Look for a new DUPLEX SINGLE in an early issue using this new valve. If it works as well as it promised, it should be really good.

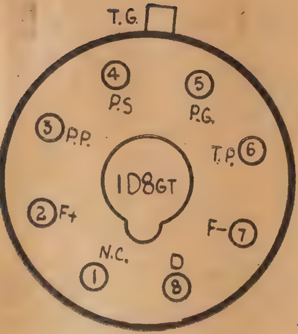
CHARACTERISTICS

The characteristics of the various sections of the 1D8-GT are not quite as good as the two separate valves, in that the triode section has a lower amplification factor.

It isn't particularly serious, because



A larger-than-life picture of the new valve. This photograph shows fairly clearly the internal construction. Actual height above the chassis is about 2½ inches.



The socket connections for the 1D8-GT.

the section still has a factor of 25, but it will drop the total gain of the set a trifle. The plate current is still very low, being 1.1 mills at 90 volts. It is still a "zero bias" triode.

The pentode also has a slightly lower output, but it also draws less B battery current—a total of 6 mills for plate and screen. The output is 200 milliwatts, and from what we have seen of the average portable set, it would be quite sufficient.

LOW FILAMENT CURRENT

The filament drain is less than that required for the two valves (1H5G and 1C5G) being only .1 amp at 1.4 volts. This again is a help, because our three-valve set will then require only .25 amps battery drain, and a B battery drain of about 10 mills. And that's pretty good going.

SUBSTITUTION

No doubt, we will from now on, receive letters asking if it would be possible to use this new valve in sets which have already been described using the 1H5G, and the 1C5G.

There is no reason why in the R. and H. Portable, for instance, the new valve should not be used to replace both the above-mentioned types.

In all cases the circuit values will be the same.

The set would then be very similar to one we have in mind for a future issue. However, much of the valve's value will be that the chassis can no doubt be made even smaller than the original, and thus the total size of the receiver considerably reduced.

We have in mind a very small cabinet for this job—as small as it can be made while still using the full-sized batteries.

Some small portables have been sold which used batteries so small that the total life has been under 100 hours. Such a set is more of a nuisance than anything else, and, so far, we have kept to our policy of avoiding designs of this nature.

We much prefer to see size reduced through the use of more efficient components, than by cutting down the capacity of the batteries.

Specify
AMPLION
ELECTRICALLY WELDED SPEAKERS
for the
BEST
results

Amplion present the lates advance in modern speake practice with their revolutionar "Electric Welding" proces Electric Welding ensures th Amplion Speakers possess ou standing fidelity and amazin sensitivity because the entir magnetic circuit is projectic welded to provide an absolu minimum of magnetic leakag reduced reluctance and increase sensitivity.

"If it's not Electrically Welded it's not an AMPLION."

AMPLION VL has greater power handling capacity than other speakers of similar type, larg voice coil diameter and impedance, and possesses tonal quality never equalled. A new typ of transformer has been developed for the Amplion V speaker in which the centre leg has square cross-section, of 7/8 inches. With low leakage and high-fidelity characteristics carries maximum D.C. currents without saturation, is double-impregnated, sealed and insulate from core. Normal Field Excitation of the VL is 10 watts, maximum 14 watts, minimum watts; voice coil impedance of 400 cycles is 12.5 ohms and diameter of voice coil is 1¼ inches, while power output ranges from 13 to 20 watts.

Amplion VL . . . PRICE £2/7/6

- **BETTER**—*Electric Welding is 1939's most out standing speaker development.*
- **BETTER**—*High output — up to 30 watts — i attained by the "V" series.*
- **BETTER**—*Extended Frequency range.*
- **BETTER**—*Complete dust-proofing.*
- **BETTER**—*Transformers impregnated, sealed and insulated from core; Field impregnated.*

Obtainable from all Leading Wholesalers and Dealers.

For the "Advance '39"	*For the "Economy 7"*
12-inch V20 TU2 . . 35/-	8-inch Permag. XP
8-inch X20 TU2 . . 25/-	13oz. magnet . . . 33/6

AMPLION (A'sia.) PTY., LTD.
382 KENT STREET, SYDNEY

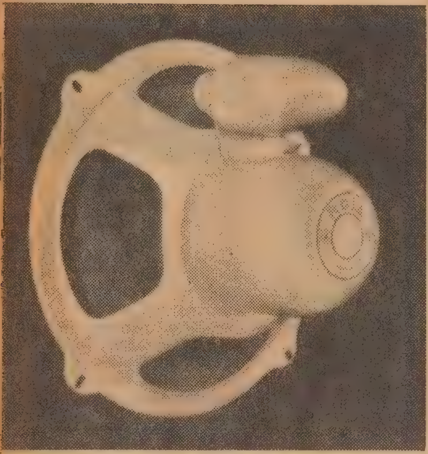
Please send me, without obligation, Catalogue showing complete details and prices of all Amplion Speakers.

Name ....

Address ....

Round the Trade

NEWS AND NEW RELEASES



☆

Here is the Rola K10 with the new cover. Similar in appearance are the K8, F10 and F12. Full details on these and other speakers are obtainable on application to the Rola Company.

☆

A NEW FIELD COVER FOR ROLA SPEAKERS

The Rola Company advises that a further improvement has been effected in the appearance of four models of Rola speakers. The new feature is a completely redesigned cover of the electro-dynamic structure on models K8, K10, F10 and F12.

THE new ensemble is shown on the accompanying illustration of K10 (identical in appearance with F10, of which photographs and blocks e available). It will be noticed that e new cover harmonises with the isore transformer, which is now fitted as andard equipment with all speakers cept the 5in. models and G12.

Of pleasing contour, the cover gives a stinctly modern appearance to the eaker to which it is fitted, and looks rticularly well in its final setting in a dio cabinet. We feel sure that the ll-balanced contours of these speaks will prove to be a definite sales ature on your set.

The cover is self-clamping to the shell the magnet assembly, and consetently requires no screws to hold it in sition.

The following dimensions will doubtless be of interest:—

Depth from cone housing to back of cover, 3 1-8in.

Diameter of cover at cone housing, 4in.

Diameter of cover at back, 2in.

The change-over to the new potcover has now been made. There will be no alteration in price of the models affected.

A new booklet of specification sheets has been completed, which also includes a pamphlet on the use of extension speakers. It will be of interest to many, and can be obtained by sending 3d in stamps, to cover postage, to the Rola Company (Aust.) Pty., Ltd., The Boulevarde and Park-avenue, Richmond E.1, Victoria.

"AMP-LITE" UNIT FILLS THE BILL

THE British New Guinea Trading Co., Limited, of Port Moresby, agents for the well-known Amp-Lite units, recently submitted a letter to the Australasian distributors, Amplion (A/sia) Pty., Limited, 382 Kent-street, Sydney, which read as follows:—

". . . I would like to say how pleased I am with the set. It has functioned perfectly since installation, and I will be happy to recommend it to anyone who may be interested.

"I have fifteen connections for lights and plugs, and do not find it too much of a strain on the plant. Of course, all these are not used at the one time, as it is not necessary, and with normal every-day use I only have to run my engine for about 1½ to 2 hours daily. This means a little over a gallon of benzine per week, which is most economical when compared with the old kerosene and benzine lamps. When that is added to the comfort and convenience that electric light brings, it is, in my opinion, well worth buying."

It is indeed gratifying to receive letters of this nature, not only on the score of the firms marketing these sets, but also being indicative of the boon they are to people located in remote areas.

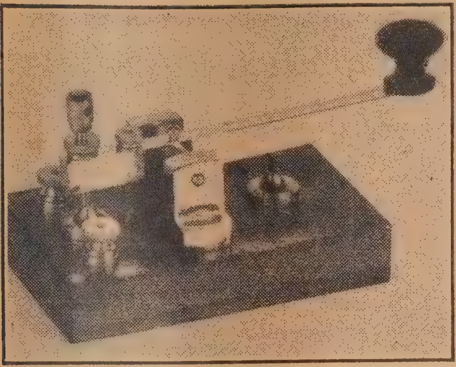
In these modern days, more and more rapidly, people far removed from big cities, electric power supply, etc., etc., are being enabled to enjoy all the comforts of modern civilisation.

NEW DATA CHART

A COPY has been received from Amalgamated Wireless Valve Company Pty. Ltd. of a new Radiotron Characteristic Chart. This time the valve company has adopted the booklet style, measuring approximately 9in. x 6in.—a form which should prove most convenient to all radio servicemen whose work calls for frequent reference to this chart. The booklet gives very comprehensive characteristic details and includes the entire range of Radiotron receiving valves. In addition to the general types, of which a large number are, of course, manufactured at the A.W.V. works at Ashfield, a page is devoted to special Australian Radiotron types, while a further supplement is included dealing with recently released general Radiotron types. The final three pages of the booklet are devoted to illustrations of socket connections.

LEVENSON'S FEATURE NEW MORSE KEYS

SEVERAL TYPES TO CHOOSE FROM



★

One of the well-finished and better quality Morse keys available from Levenson's, of Pitt Street. A large range is carried.

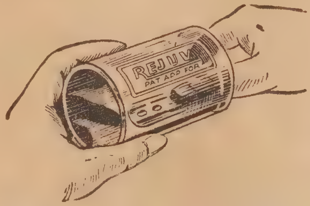
★

In the last month or so Morse Code practice has become so popular that the general stocks of most firms are becoming very low.

Levenson's, of 226 Pitt-street, Sydney, have had a special staff at work manufacturing their now famous Morse keys, buzzers and sounders.

A large range of keys is available, and a visit to the store will enable you to pick the type to suit your purpose. They are all of a uniform good quality. Levenson's advise us that the trade can be supplied with stocks.

Levenson's have just had printed the "Morse Code and Signalling Book," a helpful publication for anyone wanting to learn the code. It sells for one shilling.



It being a tradition that radio men have very tough beards, Levenson's Radio thought it very appropriate to announce their new safety razor blade sharpener in this issue of Radio and Hobbies.

Direct from the World's Fair, New York, where it sold at 7/6, this line is being sold in Sydney at the drastically reduced price of 2/-.

Consisting of a round tube of glass, the "Rejuv" blade sharpener is a great help to the man with a tough beard.

Before shaving, the glass is wet and the blade is inserted in it. With the fingers the blade is then rubbed round the inside of the tube

By this process the edge is renewed and many more shaves may be obtained from each blade.

NEW CATALOGUE

★ ★

Comprehensive Range Of Test Gear

Copies have just become available of the new catalogue released by the Paton Electrical Instrument Co., of Ashfield, N.S.W.

The catalogue, which is printed in two colors on a heavyweight art-paper, is most attractive in appearance and presentation, and covers the full range of Palec testing instruments. Concise in its presentation, this new catalogue gives the detailed specifications, brief descriptions and list price of:

Model M series multimeters.
Model CM multitester.
Palec VCT valve and circuit tester.
Model VM counter type valve tester.
Palec G type all-wave oscillator.
Palec all-wave (switchless) multivibrator, Model VIB.
Palec Model CI Cathode ray oscillator. graph.

The catalogue also illustrates and describes precision frequency calibrations and panel instruments for rock mounting.

A separate catalogue has been printed covering the full range of Palec meters.

Every radio serviceman should possess one of these attractive catalogues, which give all the desired information about this range.

For your copy, send to-day to Radio and Hobbies or direct to the manufacturers, Paton Electrical Pty. Ltd., 90 Victoria-street, Ashfield.

MORSE CLASS B RADIO COLLEGE

Special Fees Availab

Due to the outbreak of war, th college has found that there ha been an increasing demand fro students and others for instructio

Therefore, this special class has b formed to take any number of stud at one time. To enable a big class function with the utmost efficiency special Morse sending machine has b designed and built by the college. T machine will allow any number students at varying speeds to rec Morse signals at the one time.

Many positions in the naval, milit and air forces necessitate a knowle of Morse and general radio princip Therefore, any young man who wis to prepare himself for any emerge that may arise is urged to inquire ab these classes without delay.

The fees for Morse instruction very reasonable. There is no t wasted, immediately the student is re to commence, he gets right down business from the word "Go."

Morse classes are held in the A tralian Radio College premises, situa in the E. S. and A. Bank Build Broadway (opposite Grace Bros.). M days and Thursday nights are those aside for these classes. Telepho M6391/2.

Instruction is open to all, and inqui should be made direct to the colleg

---

"Brighter Broadcasting Servic Keeps Brighter With Piezo-Astatic Pick-ups!

News is to hand from E.T.C. Ind tries Ltd., Melbourne office, that another station has succumbed to advance of the Trutan B16 pick-up. A. Grace, chief engineer of the 3 Broadcasting Co., writes as follows:-

> "During the last twelve months have replaced all our lateral pick- with the Trutan B16 Piezo-Ast type.
>
> "Using a transformer to match th pick-ups to the 50-ohm mixing cuit, no difficulty was experienced equalising them for a flat respo from 50 to 6000 cycles.
>
> **"The track is very good;** and 'groove-riding' is evident w weighted to three ounces. Our pr ous pick-ups were weighted to f ounces.
>
> "I am also fitting these pick- in the studios of the new Colac Bro casting Co."

The above seems to speak for its especially the reference to the fut use of the B16 in the Colac Bro casting Co. studios. Factory repres tatives for Australia for all Ast Microphone Laboratory products E.T.C. Industries Ltd., Sydney and M bourne, who will supply any details garding these well-known lines on quest.

TRADE NOTES

EMAND FOR ADIOKES UNITS

Units such as the Radiokes dual-wave tuning assembly kit, which have become widely popular with receiver manufacturers since their comparatively recent release are among the components which undoubtedly must become more costly within a short space of time.

n view of the fact that Trolitul insu-ion is imported, there is a distinct ssibility that eventually units employ- this material will be unavailable at y price. Possibly this explains the rked increase in demand for the UI dual-wave Radiokes ready-wired, dy-adjusted tuning units, as reported Radio Suppliers Pty., Ltd.

PEAT ORDERS

n several instances manufacturers d wholesalers have placed special re-t orders, wholesalers inform us that eat and larger orders had been plac- because, first, sales of the units had ome noticeably quick, reducing stocks negligible quantities. Secondly, be-use it was feared that supplies may restricted very shortly; and, thirdly, cause an upward figure seemed most ely within a short time.

ANY ADVANTAGES

From the radio manufacturers' point view, the unit has many advantages:

1) It saves assembly time and costs.

2) It reduces unit assembly processes d responsibilities.

(3) If a fault should develop, another it is substituted quickly, and the re-onsibility of correcting the trouble (by ans of replacement) is on the shoul-rs of someone else.

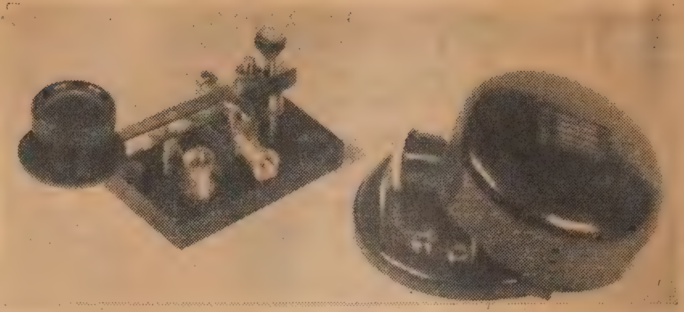
(4) It gives any instrument the sub-antial, neat finish of receivers pro-ced by larger factories.

(5) It gives the receiver more sales-peal, buyers for retail establishments -day demanding neat finish and rdy components in order to arrest the service costs and customer dissatis-ction resulting from "cheap" sets. ove all things, the Radiokes DAUI ning unit is neat, efficient, and solidly ilt, while its present ruling price re-esents a distinct economy.

CTIVITIES EXTENDED

Mr. R. K. Stokes, managing director, dio Suppliers, Pty., Ltd., informs us at in future a greater portion of the dio and electrical trade will be cover- by their activities.

Wires and raw materials for the anufacture of radio and electrical uipment, will in future be obtainable om Radio Suppliers, Pty. Ltd., while e present distribution of component dio parts (notably "Radiokes" for hich Radio Suppliers Pty. Ltd. are sole stributors), will be continued.



The Morse key and high frequency buzzer obtainable from Murdochs.

Components From Murdochs

A few more star items from Murdoch's Radio Department are shown here, although they are only some of a fine range to be had at Murdoch's.

At the top of the page is shown a very fine little Morse Code key, of approved type, suitable for general use. It is complete with a finger guard, and has heavy duty terminals for connection. Full adjustment for the movement is possible.

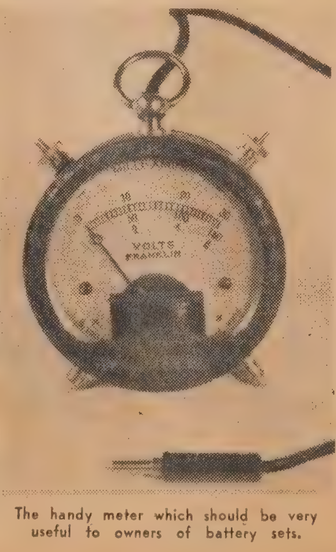
Next to it is a special high-note buzzer, which makes a suitable companion for the key. This buzzer sounds more like the real thing than the cheaper type of rough-note buzzer.

For Morse practice, these two make a first-class set. The key is priced at 9s 6d retail, and the buzzer, at 7s 11d retail.

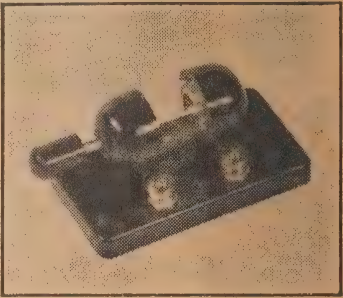
ENGLISH METER

A handy English-made meter for checking batteries, &c., is also shown here. It has two ranges of volts—0-6 volts, and 0-150 volts.

In addition, there is a range of milliamps—0-30 mills. It appears to be excellent value for the money.



The handy meter which should be very useful to owners of battery sets.



This neat little crystal detector is also available at Murdochs.

The price of the meter retail, is 12s 6d. A very handy thing for any battery set owner.

CRYSTAL DETECTOR

For the builder of small set, there is a very excellent crystal detector unit for 3s 3d. It is totally enclosed from dust and dirt, and the housing is of moulded bakelite. Terminals are provided for connection. This is a particularly neat little unit, small and easy to adjust.

High-Grade Attenuator

With the introduction of the Type A-21 attenuator, IRC is consistent in its policy of producing resistance devices of advanced and improved types. The commutator type of switching mechanism is radically different in design, yet impressive in its simplicity and obvious adherence to good mechanical and electrical practices.

This switching mechanism with the use of Types BW and BT insulated resistors, allows dependable, trouble-free attenuation with emphasis on maintenance of low noise levels in service.

This performance has been confirmed by exhaustive tests conducted by IRC as well as others over a period of more than a year.

In place of the usual stud type switch IRC utilise a moulded motor commutator. The conducting segments are polished hard drawn copper, moulded in bakelite.

Illustrating the diffusion of air by a large E.T.C. circulating fan.

E.T.C. IS READY FOR SUMMER BUSINESS IN FANS

With summer approaching, the demand for electric fans will greatly increase. To meet this demand, Eastern Trading Co. is producing the new and improved E.T.C. air circulator.

The modern design is most striking and its performance a credit to the manufacturer.

There is a large range of models to choose from and each unit is specially designed for the position it is to fulfil.

The many features which make this fan the "Rolls Royce" of air circulators are listed below:

Wick-fed oil reservoir type bearings.
Spring-loaded shaft to take propeller thrust.
Automatically lubricated thrust washers.
Aluminium centrifugal cast rotors.
Dynamically balanced rotors and propellers.
Steel bushed propellers.
Drip-proof motors.

It is no mystery why the E.T.C. circulator has leapt into popularity, the mere mention of these outstand features should bring many sales retailers.

Those interested in this quick-sell line should contact E.T.C. Industr Ltd., 470 Elizabeth-street, Sydney.

SPECIAL "R. & H." KITS AT INVINCIBLE

Since "Radio and Hobbies" has been published from month to month, there has been a great rise in radio component sales. This fact is clearly shown by the sales at Invincible Radio and Electrical Co., Ltd., of Clarence-street, Sydney.

This firm is making special preparations for the sale of kit sets for the various "Radio and Hobbies" circuits.

Upon receipt of a letter inquiring for a set, the despatch department of Invincible Radio immediately post to the inquirer a copy of the parts list and a quote, &c., for him to consider.

Invariably the order comes back to the firm and the kit set is despatched to the purchaser, packed efficiently in a large carton.

Everything is included in the kit. The buyer has the choice of the brand of the valves and speaker. The valves are guaranteed for three months and all other parts are guaranteed for one year.

Many kit sets have been sold by Invincible Radio to date and, by reports, constructors have had great success with them.

When you purchase a kit set from Invincible Radio, you are not only assured of quality goods, but of every assistance in the construction of your receiver.

PACKARD SHAVER ATTACHMENT

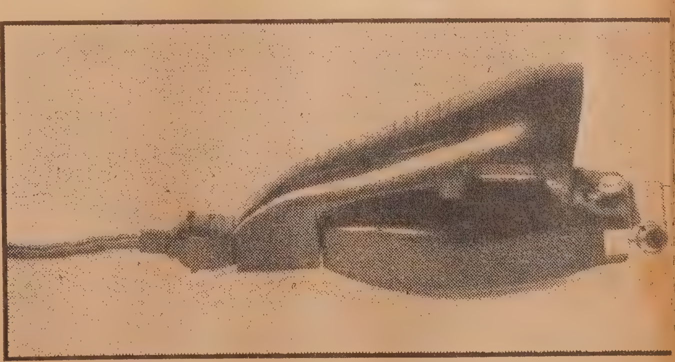
Being the Packard electric shaver distributors in Sydney, John Martin announce that they still have a number of the Shaverlite attachments suitable for Packard shavers in stock.

Throwing a beam of light directly in the path of the cutter, the Shaverlite spots those "easy to miss" areas under the chin and down the neck. It is so efficient that you will not miss a single hair or skip a patch of beard.

The attaching of the Shaverlite unit to the Packard is no bother at all. No wiring or fuss is involved, as it just plugs in between the shaver and connecting cord.

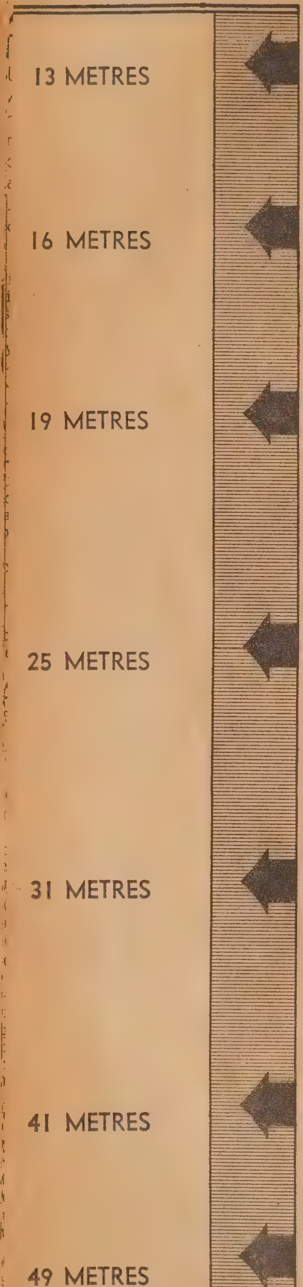
Being held snugly against the bo of the shaver, the unit tends to impro your grip while shaving.

Complete with Mazda lamp, the Sha erlite attachment sells at 13/9, and Jo Martin Pty., Ltd., advise all Packa owners to obtain this unit while th are available.



A Packard electric razor with "Shavelite" attachment.

.W. TUNING CHART



S.W. TUNING CHART

13 METRES

GST 13.92m. Daventry. 8.45 p.m. till 10.0 p.m.

GSJ 13.93m. Daventry. 8.45 p.m. till 10.0 p.m.

GSH 13.97m. Daventry. 8.45 p.m. till 10.0 p.m.

WCBX 13.91m. New York. 11.0 p.m. till midnight.

16 METRES

GSV 16.85m. Daventry. 11.0 p.m. till midnight.

GSG 16.86m. Daventry. 1.0 p.m. till midnight.

TPB3 16.81m. Paris. 9.0 p.m. onwards.

19 METRES

GSO 19.76m. Daventry. 6.45 a.m., till 8.0 a.m.

GSI 19.66m. Daventry. 3.57 p.m. till 6.0 p.m.

GSP 19.6m. Daventry. 3.57 p.m. till 6.0 p.m.

GSF 19.82m. 6.45 a.m. also from 8.45 p.m.

YDC 19.8m. Bandoeng. Good from 8.0 p.m. onwards.

25 METRES

VLR3 25.25m. Lyndhurst. 6.30 a.m. till 10.15 a.m.

Radio Saigon. 25.47m. Good station late at night.

2RO4 25.4m. Rome. Excellent from 1.0 a.m. till 2.0 a.m.

WCBX 25.36m. New York. Good from opening at 7.0 a.m.

31 METRES

GSB 31.55m. Daventry. 3.57 p.m. till 5.30 p.m.

GSC 31.32m. Daventry. 6.45 a.m. till 8.0 a.m.

YUC 31.56m. Belgrade. 6.30 a.m. till 8.0 a.m.

TAP 31.7m. Ankara. 6.30 a.m. till 8.0 a.m.

KGEI 31.48m. Treasure Island. 10.0 p.m. till 1.0 a.m.

41 METRES

TPB11 41.21m. Paris. Heard fairly well around 7.0 a.m.

GSW 41.63m. Daventry. Fair strength at 4.0 p.m.

49 METRES

KZIB 49.67m. Manila. Heard well around 9.0 p.m.

KZEG 48.86m. Manila. Heard well around 9.0 p.m.

WCBX 48.59m. New York. 4.0 p.m. till 5.0 p.m.

Radio Saigon. 49.05m. Saigon. Good from 9.0 p.m.

OVERSEAS BROADCASTERS

ENGLAND.—Probably more listeners than ever before are now listening to the Empire stations, and we are pleased to note that they are being heard at excellent strength both in the early morning, afternoons, and also at night. The many news bulletins are heard at frequent intervals, and, while they do not contain any very late items, are appreciated as being an indication of the British Government's reaction to news from other sources.

FRANCE.—There are now at least three French stations which can be heard at good level, and from which news can be heard in English. These are on the 16, 19, and 31 metre bands. The first two are heard at night, while the one on 30.99m. comes in well in the afternoons. The news sessions now seem to be read by an American, who can be understood much better than the previous announcer.

U.S.A.—At no time in the past has so much interest been directed to the American stations, as it is from these stations that all the latest news can be gleaned, usually very much ahead of the European countries concerned in the actual news. Chief of these is KGEI, on 31.48m., while there is also WGEO on the same wave-length in the mornings, not to mention WNBI and WCBX, on the 16-metre bands, both in the early mornings and also late at night. Judging by the strength of WGEO, it would appear that they are now using their new transmitter, as they come in at great strength around 7.30 a.m.

PHILIPPINE ISLANDS.—The Manila stations on both the 31 and 49 metre bands are still heard at good strength at night, and they are especially interesting now, as they also give news sessions in English, which are a supplement to that heard from the American stations.

JAPAN.—The Japanese stations have lost their interest now with regard to the war in China, but they always have a good following in this country. They have recently taken into use their 31-metre band station, JZI, in the night session, which, unfortunately, interferes very much with the popular KGEI. They are also still heard well with their various transmitters on the 19 and 25 metre bands.

ITALY.—Some good sessions are still being heard from the various Italian stations, perhaps the best being 2RO3 in the early morning, then 2RO6, on the 19-metre band, which opens at 5.0 p.m., then 2RO4, on the 25-metre band, from midnight onwards, while the 16-metre outlet, 2RO8, can be heard both late at night and also sometimes in the forenoon. Then there is the special session for Australia and New Zealand from 2RO3 from 4.0 p.m. till 5.0 p.m. every day, when strength is very good.

YUGOSLAVIA.—The New Belgrade station, YUC, on 31.56m., is now being heard at very good strength from as early as 6.30 a.m., and give their news in English usually around 7.20 a.m., when it can be followed perfectly.

RAY SIMPSON'S PAGES

The MONTH on SHORT WAVES

EUROPE'S BATTLE OF WORDS

NEW FREQUENCIES USED

The majority of short-wave listeners have now settled down to a set method of listening to the various news sessions which are now on the air from the various European and American stations. The net result of all their listening, however, must be rather bewildering, as claims of one of the combatants are very often discounted by their opponents.

Notwithstanding these difficulties, the short wave set has now truly come into its own, and one benefit of this is the attention now being given to this type of set by the various manufacturers, as they realise there will be a big market now open to them.

Conditions are fortunately very good both in the early morning and also at night, which are the most convenient times for the majority of readers to be at the short wave dials. Unfortunately not all of the dual wave sets on the market are able to receive the 13 and 16 metre stations, which are now at their best in the night sessions, though the 19 metre stations are audible at quite good level for those who are denied the use of the higher frequencies.

INTERFERENCE

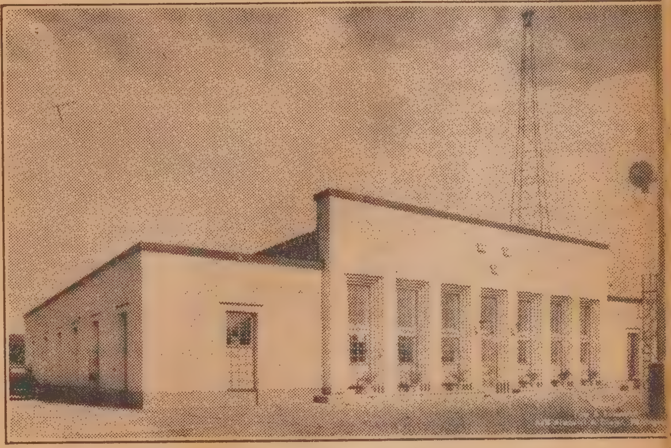
Quite an amount has appeared in the daily press as to interference experienced in regard to the French and other stations in their news services, but we must admit that we have not had any trouble at our location, and it has not been mentioned by any of our readers in their correspondence. We think that any interference which may have been present has been due to some of the commercial stations which are not normally in operation, now using some of their other allotted frequencies which are in some cases very close to the regular broadcast stations, and in fact sometimes practically on the same frequency.

One of the highlights of the month has been the reception of some of the U.S.A. stations on the 13 metre band, certainly not very loud, but easily identified. The best of these is WCBX, in New York, which opens nightly now at 11.0, having discontinued the use of their 16 metre channel at the same hour.

Another pleasing feature of the last few weeks has been the improvement in the U.H.F. stations, and we can now look forward to greatly improved reception in the near future, when the 11 metre transmitters especially should be heard well in the forenoon.

In next month's issue we hope to mention as many foreign stations as possible from which English announcements can be heard and where possible give the times. We realise the importance of this to those listeners who may not be conversant with the various languages, so would ask all those readers who are kind enough to send us reports to mention where they can as to what times they have heard any announcements in our own language.

SWEDISH SHORT-WAVE STATION



The building at Mobala, Sweden, which houses the country's short wave transmitters.

READERS' REPORTS

While speaking of readers' reports, we have a favor to ask of our correspondents—when making out your reports would you kindly list all stations in similar groups to those we use in our "Listen for These" pages, that is, put all the North American together, likewise the Daventry, India and Asia, and other groups. This would be of great benefit to us when crediting a reader with reporting a station, and avoid the necessity of turning backwards and forwards through all our lists to find a particular station. We trust this will be found convenient to our readers and thank them all in anticipation.

U.H.F. BANDS OPEN

With the approach of summer conditions, the U.H.F. bands have once more become active and should improve rapidly from now on.

The 9 metre commercial stations see to have disappeared entirely, b on the 11 metre band we hea W6XKG, W8XNU, and also W4X. Chief activity, however, has be noticed on the various poli frequencies, where we have heard WQ KQBE, WQKB, KQBR, KQAH, a WQXO. Some of these stations a heard at very good speaker streng and varied announcements ranging fro missing children being enquired aft vicious dogs, stolen cars, bank bandi etc., provide a diversion from the mo usual run of listening. Listeners shou give these higher frequencies a lo over any forenoon from 10.0.

MTCY TRANSMISSIONS

We have received complete schedu of the various sessions from the Ma chukuo station MTCY, located in Hsi king, which are as follow: Frequen 11,775kc. or 25.48m.—

To Europe—7 a.m. till 7.50 a.m. Programme: News, music and oth entertainment.

To America, Canada, Mexico, a Hawaii, 4.30 p.m. till 5.20 p.m.— Programme: News, music, and oth entertainment.

To Australia, N.Z., French Indo Chin and South Seas, 12.55 a.m. till 1. a.m.

The power used by this station 20kw., and the address is 601 Daid Taigai, Hsinking, Manchukuo.

ANTI-NAZI STATION HEARD IN AUSTRALIA

Has Been Logged On 29.8 metres

"DEUTSCHE FREIHEITS SENDER"

Since the war began, much has been written in the Press and radio journals re the anti-Nazi station which is working under cover in Germany, but it is only within the last week or so that we have actually heard it ourselves. It can now be heard every morning from just before 7.0 a.m. till they close down at 7.50 a.m.

Up to the present we have not heard ny English announcements, but no ifficulty is experienced in identifying t, as they frequently announce as Deutsche Freiheits Sender," usually receding this by "Achtung, Achtung."

The frequency being used is 10,070kc., 9.8m. The entire transmission consists f impassioned outbursts in German hich, though we do not understand the anguage, leave little doubt as to what is heir purpose.

While the strength of this station is ot as strong as the regular German tations, it comes in at quite good peaker level. Just on the low waveength side of it is a U.S.S.R. station hich on some occasions interferes with t slightly, but usually it is in the clear. We understand that one of the Sydney roadcast stations will shortly present a series of broadcast dramatisations concerning this German station, which has now raised so much interest throughout the world. If any English is heard at a later date we will publish full details as early as possible.

Quite a noticeable feature of this station is the fact that it will be approximately the same strength for three or four days, then suddenly become very much weaker one morning, while all the other stations in the same location and similar wavelengths retain their usual level. We put this down to the fact that they use different transmitters from time to time, in order to lessen the chance of detection.

As an aid in locating this station, readers are advised to tune in DZB on 29.87m in their Italian session which closes at 6.40 a.m., and then tune very slightly lower in wavelength at 7.0 a.m. when this Anti-Nazi station should easily be found.

Walter S. Lemmon, founder of WRUL (WIXAL) at the transcription machine at the station, with Hollis S. Baird, the Chief Engineer.

VERIFICATION OF OUR U.H.F. REPORT

FINE 9m. RECEPTION

(Extract from U.S.A. newspaper re reception in Australia of police radio station.)

Mr. John P. Doege, chief operator of WQKC, the New Rochelle, N.Y., police radio station, sends us the following extract from one of their local radio papers, which shows the interest taken in reports from this country.

"Police radio signals heard 10,000 miles away."

The department's chief operator today received a report from Mr. Simpson, of Concord West, Australia. Mr. Simpson stated the time each message was transmitted with its full contents, together with the station call letters and the operator's number.

Since the installation of the police radio system almost four years ago, the greatest distance, according to reports received, that the 50 watt station transmitted signals was as far as Los Angeles, Cal., a distance of 3500 miles. No report was ever received from abroad. Our local cops will have to abandon the old excuse of not receiving calls, or take the chance that the call directed to them was not received way down in Australia.

AVERAGE SIX MILES!

For a 50 watt station on the U.H.F. band of 31,500kc., the average distance is about six miles for good coverage, but the chief operator explains that such coverage is possible in times of rare atmospheric conditions due to the height and density of the heavyside layer and the angles of radiation that tend to increase the skip distance.

Reports such as this may help explain the reason for the strict enforcement of Federal Radio Laws by the Federal Communications Commission. The calls sent out by the police radio system are not heard by the local cops, but may be heard by hundreds of persons all over the U.S., even way down in Australia.

STATION ADDRESSES

HP5A.—Radio Teatro, Apartado 954, Panama City, Panama, Central America.

LZA.—Director General, Telegraphs and Telephones, Sofia, Bulgaria.

FK8AA.—Charles Gaveau, 44 Rue de Alma, Noumea, New Caledonia.

CR7AA and CR7BH.—P.O. Box 594, Lourenco Marques, Mozambique, Portugese East Africa.

REPORTS FROM READERS

Being replies to letters and reports of readers deemed to be interesting to everyone. Reports of short-wave reception may be sent to Mr. Ray Simpson, c/o "Radio and Hobbies," "Sun" Building, Sydney.

Mr. G. Hayman (Bronte, N.S.W.) Once again we have to welcome a new correspondent, who sent a very interesting and also humorous letter. You evidently get quite an amount of amusement from your listening besides the usual programme enjoyment. Write again, Mr. Hayman, and give your impressions of other items which you hear, as I am sure they will be worth reading.

W. J. Dun (Grenfell, N.S.W.). We are very much indebted to Mr. Dun for sending us some extracts of his own short wave notes to one of his local papers, and compliment him both on the number of stations received and also on the interesting way he presents them to his readers. Many thanks for recommending R. & H. to the people of Grenfell.

Mr. H. R. Cox (Cobden, New Zealand). One of our New Zealand readers sent another list of stations heard in the sister Dominion and comments on the fact that reception is not too good from an easterly direction. Yes, we agree with you, and think that a 6K8G might prove the better valve under the circumstances, as we have found it very satisfactory on short waves. Looking forward to hearing from you again.

Mr. E. Bennett (Wiluna, W.A.). We welcome another listener from West Australia who is very pleased with Radio & Hobbies. The Government experimental station in Rangoon, Burma, is actually XYZ, and as you will see has been mentioned in our lists for many months past. Many thanks for the information all the same. Will probably have written you before you receive the November issue re the manner of obtaining verifications from short wave stations.

Mr. H. Medina (Waverton, N.S.W.). Once again we have received an excellent list of stations from Mr. Medina, also a query as to a station on 49.03m., with closing announcement in English. We would suggest that this may be "Radio Saigon," which is usually given as being on 49.05m. We trust that the aerial is now giving better results after your attention to it.

Mr. B. W. Battis (Coraki, N.S.W.). All the well known stations are coming in well in the Coraki district, as shown by the list sent in by Mr. Battis. We think the strong station you are hearing just below Saigon will be MTCY in Manchukuo on 6125kc. Yes, I think quite a few readers have received verifications from TGWA on 9685kc., though they are admittedly a little slow in sending them out. As you will notice we are giving a few more addresses this month.

Mr. Colin B. Marks (Bellevue Hill, N.S.W.) has found it necessary to forsake the amateur bands and concentrate on the broadcast stations and has succeeded in compiling quite an interesting list of all the well known broadcasters. We have written to you giving the addresses of the stations you asked for, and will be pleased to supply any others as you may want them. Write again telling us how you are progressing with your loggings.

Mr. M. Foster (Mount Vincent, N.S.W.). Our old friend Mr. Foster sends along his usual comprehensive list, showing his loggings during the month. We think your station KEF is really KES, on 28.82m., as KEF is listed as being on 44.71m. Many thanks for information re the Italian stations, as items like these are always helpful.

Mr. R. K. Clack (Chester Hill, N.S.W.). advises us that he heard the Japanese station announce that from October 1 they would be using JZI, on 9535kc., instead of JZK, while JZJ will remain in use as at present. Mr. Clack heard his name called from "Radio Saigon" in one of their English sessions. Glad to hear you received your verification from W6XBE, which, of course, is now KGEI.

Dr. K. B. Gaden (Thargomindah, Qld). Our regular correspondent from far away Thargomindah is still getting excellent results judging by his log, and what is most interesting is the fact that the U.H.F. are again becoming audible. The doctor notices a falling off in the 49 metre band stations, but finds the morning stations holding out well until around 8 a.m. Your reports are among the most interesting we receive, due to the many lesser heard stations you report.

Mr. P. H. Ford (Rockhampton, Qld.). Since Mr. Ford last wrote he has been travelling extensively in the Rockhampton district, but has still managed to turn in a very good log. He has tried all sorts of improvised aerials in his travels, including connecting to the top wire of a fence, and still the stations come in! Many thanks for the interesting letter, which came in on time.

FLASHES FROM EVERYWHERE

COLOMBIA

We learn from the Globe Circler th the Colombian stations have recen changed all their call letters, a f of which we list herewith: HJAE fro HJ1ABE, HJAB from HJ1ABB, HJI was HJ6FAH, HJAG from HJ1AB There is also a new station being co structed in Bogota to work on 9630k 31.15m., under the call HJCT.

CUBA

From the same source it is stat that a new station has been licens to operate on 9437kc. under the c COCN. This channel is at present use by COCH, so they may share tin

ITALY

Watch out for another Italian st tion on the 13-metre band which w operate 21,510kc., using the call lett 2RO16. Probably in use from midnig onwards, we think.

U.S.A.

We hear from a correspondent th WCAB, in Philadelphia, will shor make use of their U.H.F. channel 25,725kc., which is, of course, in t 11-metre band. When in use will heard best in the forenoon.

The World Wide Broadcasting Servi has now applied for a licence to opera on two additional frequencies, name 6080kc. and 25,600kc. If granted, t call will be WRUW.

SYRIA

The French Colonial authorities ha inaugurated a station in Damasc which has been heard testing on abo 24.4m. around 5.0 a.m., but has n been heard in this country, as far we know.

ENGLISH NEWS SESSIONS

In addition to the numerous ne bulletins given by the Daventry, Berli Paris, and Rome stations, listeners a recommended to tune in the followi stations which also give this service:

ZHP, Singapore, 30.96, at 10.0 p.
VUD2, Delhi, 31.28, at 10.30 p.m.
KZRM, Manila, 31.35, at 10.30 p.m.
YUC, Belgrade, 31.56, at 7.20 a.m.
JDY, Darien, 30.23, at 10.45 p.m.
KGEI, Treasure Island, 31.48, at 10 p.m. and 12.30 a.m.
WPIT, Pittsburg, 25.27m., at 8.45 a.
JVW3, Tokio, 25.59m., at 7.55 p.m.
JZJ and JZK, 25.42m. and 19.79m at 6.0 a.m. and 10.30 p.m.
XGX, Chungking, 25.21m., at 9. p.m.
XGX, Chungking, 16.85m., at 12. p.m. and 2.20 p.m.
XMHA, Shanghai, 25.32m., at 9.30 p.
XPSA, Kweiyang, 42.8m., at midnigh
RNE, Moscow, 25.00m., at 6.0 p.m.
RV96, Moscow, 19.47m., at 6.15 a.
RV96, Moscow, 19.76m., at 6.0 p.m
EAQ, Madrid, 30.44m., at 6.15 a.m.
WNBI, New York, 16.87m., at 1.0 p.
WCBX, New York, 25.36m., at 7. a.m.

Listen for these!

OVERSEAS STATIONS NOW AUDIBLE

Here is a list of short-wave stations which have actually been heard over the last few weeks. Most of these should be heard by any of our short-wave fans who have a good set and location. Details of each station are given, and when also reported by readers, their names appear in brackets.

ENGLAND

GSA.—6050kc., 49.59m., Daventry. Very much weaker now than it was a few weeks ago. (Ford, Medina, Foster).

GSB.—9510kc., 31.55m. Probably the loudest of all the Daventry stations in the afternoon. (Lee, Ford, Medina, McKinnon, Gaden, Marks, Emery, Foster).

GSC.—9580kc., 31.32m. This station is quite good at 7 a.m. when news is given. (Gaden, Foster, Ford, Lee, Sullivan, Dun).

GSD.—11,750kc., 25.53m. This one is very good in mornings till closing at 6.15 a.m., also on opening at 6.50 a.m., and in afternoons. (Marks, Medina, Ford, Lee, Gaden, Clack, Foster, McKinnon, Dun, Emery).

GSE.—11,860kc., 25.29m. Opens at 6.50 a.m., but not very strong; also used in afternoons for Europe. (Gaden, Clack, Foster, Marks, Ford, Lee).

GSF.—15,140kc., 19.82m. This 19-metre station is good in early a.m.; also in afternoon and night. (Medina, McKinnon, Ford, Lee, Gaden, Dun).

GSG.—17,790kc., 16.86m. Quite a good station, now from 9.0 p.m. onwards. (Gaden, Foster, Battis, Ford, Lee, Sullivan, Dun).

GSH.—21,470kc., 13.97. This 13-metre station is heard best from 9 p.m. till 10 p.m. (Lee, Gaden).

GSI.—15,260kc., 19.66m. Another good afternoon station, and also comes in at night. (Marks, Gaden, Foster, Clack, Ford, Lee, Sullivan, Emery).

GSJ.—21,530kc., 13.93m. This is the loudest of the 13-metre stations at night from 9 till after 10. (Gaden, Lee).

GSO.—15,180kc., 19.76m. This one is heard best in the morning at 6.50 onwards. (Medina, McKinnon, Gaden, Ford, Lee).

GSP.—15,310kc., 19.16m. Another afternoon station which comes in at quite good level, and also heard in evening. (Ford, Lee, Gaden, Clack, Marks, Foster, Sullivan).

GST.—21,550kc., 13.92m. This is the new 13-metre station, but it is not as loud as GSJ. (Lee, Sullivan).

GSV.—17,810kc., 16.85m. Another 16-metre band station, which is now heard very well in the session, opening at 8.45 p.m. (Ford, Lee, Battis, Foster, Gaden).

GSW.—7230kc., 41.49m. This new 41-metre band station is meant mainly for Europe, but can be heard fairly well in the afternoons. (Gaden, Clack).

GRX.—9690kc., 30.96m. This is another morning station and gives news in various foreign languages around 6.30 a.m. till after 7 a.m. (Gaden).

FRANCE

TPA2.—15,245kc., 19.68m., Paris. This well known French station has improved greatly at night, and is also heard in forenoon. News in English at 9.0 p.m. (Medina, Battis, Foster, Gaden, Clack, Lee).

TPA3.—11,885kc., 25.23m. Audible in morning and also in the forenoon. News in English at 9.30 a.m. (Medina, Ford, McKinnon, Foster).

TPA4.—11,720kc., 25.6m. This one is very good in the afternoon and gives news in English at 2 p.m. and also at 3.40 p.m. (Ford, Emery, Clack, Gaden, Foster, McKinnon, Marks, Dun).

TPB3.—17,850kc., 16.81m. Now a very good station at night, and gives news in English at 9 p.m. (Ford, Foster, Gaden, Lee, Dun).

TPB7.—11,885kc., 25.23m. Another good French station with news in English at 2 p.m. and also at 6.15 p.m. (Medina, Ford, McKinnon, Foster, Emery).

TPB6.—15,130kc., 19.83m. This station also gives news in English at 6.15 p.m. (Ford, Battis, Foster, Gaden, Clack, Dun).

TPB11.—7280kc., 41.21m. Now very much weaker than it was a few weeks ago. (Ford, Medina, Gaden, Emery).

—.—9680kc., 30.99m. This is the new French station heard very well in the afternoons and gives news in English at 2.30 p.m. and also at 3.30 p.m. (Gaden, Lee, Cox).

AUSTRALIA and OCEANIA

VLR.—9580kc., 31.32m., Lyndhurst. The national station is heard at good strength at night in most districts. (Lee, Ford, Medina, Hayman, McKinnon, Battis, Marks, Clack, Foster, Emery.)

VLR3.—11,880kc., 25.25m., same location. The 25-metre channel is used until midday, and comes in very well. (Lee, Ford, Sullivan.)

VK9MI.—6052kc., 49.57m., M.V. Kanimbla. This ship's transmitter was heard well until the outbreak of war, since when it is, of course, silent. (Ford, Emery.)

VPD2.—9538kc., 31.38m., Suva, Fiji. Another of the A.W.A. transmitters heard well at the beginning of September. (Ford, Medina, Emery.)

FK8AA.—6122kc., 49.00m., Noumea, New Caledonia. Has been heard very well on Wednesdays and Saturdays from 5.30 p.m. till 6.30 p.m. (Lee, Ford, Medina, Gaden, Clack, Foster.)

ITALY

2RO3.—9635kc., 31.13m., Rome. Still coming in nicely in the mornings, and gives news in English around 7.20 a.m. Also quite strong in afternoon session from 4.0 till 5.0. (Ford, Medina, McKinnon, Emery, Cox, Lee, Foster, Clack, Gaden, Battis).

2RO4.—11,810kc., 25.4m. This one is heard best in the very early morning till closing at 2 a.m. (Gaden, Lee, Emery).

2RO6.—15,300kc., 19.61m. Can be heard in the mornings with same as 2RO3, but best on opening at 5 p.m. (Ford, Battis, Gaden, Lee, Dun).

2RO8.—17,820kc., 16.84m. Heard best between 9.30 a.m. and 10 a.m., and also between 9 p.m. and 10 p.m. (Ford, Gaden).

2RO9.—9667kc., 31.03m. Another of the morning stations, but not as good as 2RO3. (Ford, Medina, Gaden).

2RO12.—15,100kc., 19.87m. This one is sometimes used in the mornings from 8.30 a.m. (Gaden, Clack, Foster).

2RO?.—15,230kc., 19.7m., Rome. On some mornings this Italian is nearly as good as 2RO6. Call letters not shown in Italian list.

IQY.—11,670kc., 25.74m. This station is on the air in the mornings at 7.0, but is now very weak at our location.

NORTH AMERICA

WGEA.—9550kc., 31.41m., Schenectady, N.Y. Can be heard, but is fairly weak at 9.0 a.m. (Cox.)

WGEA.—15,330kc., 19.57m., same location. This one is heard best in the mornings at about 7.30. (Gaden, Clack.)

WGEO.—9530kc., 31.48m., same location. Now being heard at very good strength in mornings at 7.30, and also in afternoons till closing at 4.0. (Ford, Cox, Foster, Gaden, Clack, Lee.)

WCAB.—9590kc., 31.28m., Philadelphia, Pa. On certain days can be heard at good strength at 8.30 a.m., also at 4.0 p.m. (Cox, Ford, Emery.)

KGEI.—6190kc., 48.47m., Treasure Island, Cal. Not as strong as they were previously on this frequency, but improve towards 6.0 p.m. (Ford, Cox, Medina, Foster, Gaden, Clack, Lee, Dun.)

KGEI.—9530kc., 31.48m., same location. Still heard at good strength on opening at 10.0 p.m., but now interfered with by JZI. (Ford, McKinnon, Sullivan, Lee, Clack, Gaden, Cox, Medina, Marks, Battis, Foster, Dun.)

KGEI.—15,330kc., 19.57m., same location. Around lunch-time they can still be heard at fair level. (Ford, Cox, Foster, Gaden, Clack, Dun.)

WLWO.—6060kc., 49.5m., Cincinnati, O. Not as strong as before, but still coming in around 5.0 p.m. and also at 9.0 p.m. (Ford, Cox, Foster, Clack.)

WBOS.—9570kc., 31.35m., Boston, Mass. In the afternoons can be heard, but only faintly. (Cox.)

WRUL.—11,790kc., 25.45m., some location. This station, which gives many educational talks, can be heard on week mornings around 7.30. (Cox, Foster, Gaden, Ford, Dun.)

WRUW.—11,730kc., 25.58m., same location. On Monday mornings this one is heard in place of WRUL. (Formerly W1XAR.) (Ford.)

WRCA.—9670kc., 31.03m., New York, N.Y. Still being heard at 8.30 a.m. and also in afternoons till 3.0. (Cox, Foster, Clack.)

WPIT.—11,870kc., 25.27m., Pittsburg, Pa. Comes in best in the mornings at about 7.30. (Ford, Cox, Medina, Foster, Clack, Gaden, Lee, Sullivan, Emery, Dun.)

WPIT.—15,210kc., 19.72m., same location. Not as strong as it was last month in the very early hours. (Clack, Dun.)

WPIT.—21,540kc., 13.93m., same location. This is the first time we have heard this frequency in use, but at the time of reception, 10.0 p.m., was very weak.

WCBX.—6170kc., 48.62m., New York, N.Y. Only heard in the afternoons from about 4.30 till 5.0. Now changed to 6120kc. (Gaden.)

WCBX.—11,830kc., 25.36m., same location. Now opens at good strength every morning at 7.0. (Ford, Hayman, McKinnon, Cox, Medina, Foster, Clack, Gaden.)

WCBX.—17,830kc., 16.83m., same location. On opening at 11.0 p.m. is rather weak, but heard much better in mornings till closing at 9.0. Night session now on 21,570kc. (Lee, Gaden, Foster.)

NEW STATIONS RECEIVED

EACH month in this panel we will list all stations, definitely identified, which have not been previously heard at our own location, or by our readers.

KC.	Metres	Call	Location	
6190	48.47	KGEI	Treasure Island,	California
9680	30.99	—	Paris,	France
9695	30.95	JIE2	Tyureki,	Taiwan
10,070	29.8	"Deutsche Freiheits Sender"		Germany
21,500	13.96	WGEA	Schenectady,	New York
21,540	13.93	WPIT	Pittsburg,	P.A.
21,550	13.92	GST	Daventry,	England
21,570	13.91	WCBX	New York,	New York

WNBI.—17,780kc., 16.87m., same location. Another New York station which comes in nicely in the mornings around 8.0, also heard with news at 1.0 p.m. (Ford, Cox, Battis, Gaden, Lee, Dun.)

WPIT.—6140kc., 48.86m., Pittsburg, Pa. This one heard in New Zealand in the late afternoon. (Cox.)

WCAB.—15,270kc., 19.64m., Philadelphia, Pa. Has been heard late at night in some locations. (Battis, Cox, Foster.)

KKZ.—13,690kc., 21.91m., Bolinas, Cal. Still giving programmes on Sunday afternoons from 1.30 till 2.45. (Ford, Foster, Clack.)

WCBX.—21,570kc., 13.91m., New York, N.Y. The Columbia Broadcasting System has just started to use this outlet again, and we have heard it for the first time very weakly opening at 11.0 p.m.

WCBX.—6120kc., 49.00m., same location. This C.B.S. station is heard now between about 4.30 p.m. and 5.0 p.m. in place of 6170kc. (Cox.)

WCBX.—9650kc., 31.09m., same location. Can now be heard weakly until it closes at 2.30 p.m.

WGEA.—21,500kc., 13.96m., Schenectady, N.Y. Another of the General Electric stations which can be heard from about 10.30 p.m.

XEWW.—9503kc., 31.57m., Mexico City, Mexico. This is the only Mexican which has been heard during the last few weeks. (Ford, Cox.)

SOUTH AMERICA

LRA1.—9690kc., 30.96m., Buenos Air Argentine. Has been heard on a fe occasions at 8.0 a.m.

CXA6.—9620kc., 31.19m., Montevide Uruguay. Only heard weakly in t mornings at 7.0.

CXA8.—9640kc., 31.12m., same locatio Can be heard at night weakly, a also audible in the late afternoor especially Sunday.

CB960.—9600kc., 31.25m., Santiag Chile. Now being heard every nig when they open at 10.0.

CD1190.—11,910kc., 25.19m., Valdiv Chile. Comes in best late at nigh and also in the afternoons till closi at 2.0. (Clack.)

HCJB.—12,460kc., 24.08m., Quito, Ecu dor. Only a weak signal now fro this South American, but still easi identified. (Ford, Foster, Lee, Clack

OAX4J.—9340kc., 32.12m., Lima, Per Only heard on a Sunday afternoo and not as strong as previously. (For Lee.)

OAX5C.—9350kc., 31.95m., Inca, Per Another Sunday afternoon statio but not as strong as OAX4J.

PRA8.—6015kc., 49.87m., Pernambuc Brazil. On some mornings still hea opening at 7.0.

CXA2.—9570kc., 31.35m., Montevide Uruguay. On some mornings can heard at 9.0, announcing as "Rad Continental."

CB970.—9710kc., 30.91m., Valparais Chile. Another South American au ible on some mornings at 9.0.

CENTRAL AMERICA AND WEST INDIES

TGWA.—15,170kc., 19.78m., Guatemala City, Guatemala. Comes in at quite good strength on Saturday and Sunday afternoons till 2.30.

TGWA.—9685kc., 30.98m., same location. Now a popular Sunday afternoon station with frequent English announcements. (Ford, McKinnon, Medina, Clack, Emery).

RADIO MARTINIQUE.—9705kc., 30.92m., Fort-de-France. Has been tuned in occasionally opening at 9 a.m.

COCQ.—8850kc., 33.9m., Havana, Cuba. This well-known Cuban is still audible, opening at 9.50 p.m. (Lee, Emery).

COJK.—8685kc., 34.54m., Camaguey, Cuba. Only heard up till the middle of September, opening at 9.30 p.m. or later.

COCM.—9850kc., 30.46m., Havan Cuba. Now only weak on opening 11 p.m.

COBC.—9985kc., 30.05m., same locatio This station is the loudest Cuban the present time. (Ford).

TILS.—6165kc., 48.66m., San Jose, Cos Rica. This Costa Rican station ha been heard in the late afternoons well as at night. (Battis, Lee, Gaden

TIPG.—9615kc., 31.21m., same locatio One of the loudest stations on the 3 metre band at night until about 10.4 when they weaken. (Battis, Gade Foster, Medina; Ford).

COY.—69.9m., Cuba. Mr. Emery repor hearing this station at R4Q2 one nigh at 10.30. (We believe this to be a army station).

CENTRAL AMERICA AND WEST INDIES—CONTINUED

HP5J.—9590kc., 31.28m., Panama City, Panama. Another Central American which comes in nicely from 10 p.m. (Ford).

HP5K.—6005kc., 49.95m., same location. Only heard weakly up till about the middle of September.

TGWB.—6490kc., 46.19m., Guatemala City, Guatemala. On some nights is heard at good strength from as early as 9.30. (Ford).

HP5A.—11,700kc., 25.64m., Panama City, Panama. Heard well on some nights around 11. (Foster).

COCH.—9437kc., 31.8m., Havana, Cuba. This Cuban is still being heard in the late afternoons.

COGF.—11,800kc., 25.42m., Matanzas, Cuba. This one is now being heard faintly in the mornings at 8, but not at night.

INDIA AND ASIA

JZJ.—11,800kc., 25.42m., Tokio, Japan. Comes in nicely at night; gives news in English at 10.30. (Ford, Medina, Battis, Lee, Clack, Foster).

JZK.—15,160kc., 19.79m., same location. Also heard at night and also in the afternoon around 1.30 p.m. Also good at 6 a.m. when news in English is given. (Ford, Medina, Battis, Clack, Lee).

JZI.—9535kc., 31.47m., same location. Has now commenced operating again, opening at 10 p.m. (Emery).

JZL.—17,785kc., 16.87m., same location. Occasionally this one can be heard around midday. (Lee).

JVW3.—11,720kc., 25.6m., same location. On the air both in the mornings and also after 7 p.m. News in English at 7.55 p.m. (Ford, Emery, Lee, Clack, Medina).

JLG3.—11,705kc., 25.63m., same location. This one can also be heard in the mornings and also at night.

JFO.—9635kc., 31.13m., Taihoku, Taiwan. This one has only been heard till about mid-September at our location.

JIE2.—9695kc., 30.95m., Tyureki, Taiwan. This is a new station which has frequently been heard after midnight, when it interferes with ZHP.

JDY.—9925kc., 30.23m., Darien, Manchukuo. The English session from this station can still be heard at 10.45 p.m.

MTCY.—11,775kc., 25.48m., Hsinking, Manchukuo. Still heard in the early morning opening at 7 and sometimes at 6.0 a.m. (Ford, Medina, Clack, Foster, Battis).

MTCY.—6125kc., 48.98m., same location. Still a very strong station at night. (Lee).

MTCY.—15,200kc., 19.74m., same location. Has been heard in the mornings carrying same programme as 11,775kc., transmitter. (Ford).

KZRM.—9570kc., 31.35m., Manila, P.I. One of the best stations on the 31-metre band. Gives news in English at 10.30 p.m. (Clack, Battis, Emery, Lee, Ford, Hayman, McKinnon, Medina, Marks).

KZIB.—9500kc., 31.58m., same location. Another powerful Manila station (Sometimes using call KZRD, according to Mr. Emery). Coming in well at present. (Clack, Foster, Battis, Marks, Medina, Lee, Ford, McKinnon).

KZIB.—6040kc., 49.67m., same location. This is the 49-metre outlet of the same station; also heard well. (Clack, Foster, Medina, Ford, Lee).

KZRH.—6110kc., 49.1m., same location. On the air nightly, but hard to separate. (Clack, Foster, Medina, Ford, Lee).

KZRF.—6140kc., 48.86m., same location. This one is sometimes heard using this frequency, while at other times it is KZEG. (Clack, Lee, Ford, Cox, Medina, Foster).

RADIO SAIGON.—6116kc., 49.05m., Saigon, F.I.C. A very powerful station, heard every night. (Clack, Foster, Medina, Bennett, Ford, Emery).

RADIO SAIGON.—11,780kc., 25.47m., same location. This 25 metre band outlet is also used at night time when not on 49.05m. (Clack, Medina, Ford).

——— 9680kc., 30.99m., Saigon. This is another Saigon station heard every night, but call letters are not known.

ZHP.—9690kc., 30.96m., Singapore, S.S. Not as strong as it was a few weeks ago. (Clack, Foster, Battis, Marks, Medina, Ford, Lee).

ZHJ.—6080kc., 49.3m., Penang, S.S. This one still puts in quite a nice signal at night. (Clack, Foster, Medina, Ford, Lee).

XYZ.—6007kc., 49.94m., Rangoon, Burma. The Government short-wave station is heard every night at quite fair strength. (Bennett).

HS8PJ.—9510kc., 31.55m., Bangkok, Siam. When on the air is quite a good station with frequent English announcements. (Clack, Medina, Lee).

ZBW.—9525kc., 31.5m., Hongkong, China. This is now a very reliable station and comes in well nightly. (Clack, Foster, Battis, Marks, Medina, Lee).

YDB.—9550kc., 31.41m., Bandoeng, Java. Not very strong but can always be heard at night. (Ford, Foster, Clack).

YDC.—15,150kc., 19.81m. Same location. This station excels with real entertaining sessions every night, and can also be heard in the forenoons. (Ford, Medina, Battis, Foster, Clack, Lee, Emery).

YDD.—6045kc., 49.63m. Same location. Another night station which is sometimes hard to separate from KZIB. (Lee).

YDX.—7220kc., 41.55m., Medan, Sumatra. The native programmes from this one come in well, but are not very entertaining. (Ford, Clack).

PMH.—6720kc., 44.64m., Bandoeng, Java. This is always a loud station, and sometimes quite interesting to listen to. (Ford, Foster, Clack, Lee).

PMN.—10,260kc., 29.24m. Same location. A regular night station which carries the usual N.I.R.O.M. programme. (Ford, Medina, Foster, Clack, Sullivan, Lee).

VUD2.—9590kc., 31.28m., Delhi, India. This has now become a very loud station on opening at 10.30 p.m. with news in English. (Medina, Clack, Dun, Lee).

VUD3.—15,290kc., 19.62m. Same location Can be heard at lunch time, but not very strongly.

PLP.—11,000kc., 27.27m., Bandoeng, Java. Another N.I.R.O.M. outlet still coming in well in some locations. (Ford, Medina, Foster, Clack, Lee, Emery).

VUD8.—4960kc., 60.48m., Delhi, India. Can be heard at 10.30 p.m. with news in English. Notice new call letters, changed from VUD2. (Lee).

VUM2.—4920kc., 60.98m., Madras, India. Another Indian station which is heard at 10.0 p.m. with news in English. (Lee).

XGX.—17,800kc., 16.85m., Yunnan. Only a weak signal, but news in English can be followed at 12.50 p.m. and 2.30 p.m. This station was formerly XGOY. (Ford, Gaden, Emery).

XGX.—11,900kc., 25.21m. Same location. Comes in well at night and gives news in English at 9.20 p.m. (Formerly XGOY). (Ford, Medina, Lee, Clack, Foster, Battis).

XMHA.—11,850kc., 25.32m., Shanghai, China. Still audible at night, and gives news in English at 9.30 p.m. and 10.30 p.m. (Ford, Emery).

XPSA.—7000kc., 42.8m., Kweiyang, China. Quite a strong station at night, and gives news in English at midnight. (Ford, Medina, Clack, Lee).

XJOD.—6870kc., 43.67m., Hankow, China. This one has native type music and is fairly strong. (Ford, Foster).

XGOK.—11,810kc., 25.4m., Canton, China. This is not a regular station but is sometimes heard quite well.

JVW.—7277kc., 41.24m., Tokio. The Japanese authorities have taken this station into commission and has been heard at midnight. (Ford).

JLT2.—9645kc., 31.11m. This 31 metre band Japanese station has again been heard, this time by Mr. Emery in Bathurst.

JLU3.—15,130kc., 19.83m. This Japanese station has been heard late at night with same programme as JZJ.

JVW4.—15,235kc., 19.69m. Another seldom heard Japanese which can be heard occasionally around 6.0 a.m.

VUC2.—4840kc., 61.98m., Calcutta, India. At 11.0 p.m. this Indian can be heard but rather noisy. (Dun).

KTR.—10,910kc., 27.5m., Manila, P.I. This point to point R.C.A. station heard in special transmission at 10.0 p.m. (Sullivan).

MISCELLANEOUS

CSW7.—9740kc., 30.8m., Lisbon, Portugal. On opening at 7.0 a.m. this station is very good. (Lee, Gaden.)

CSW8.—7260kc., 41.32m., same location. This station is now inaudible at our location, but heard a few weeks ago. (Medina, Gaden, Ford.)

HBO.—11,402kc., 26.32m., Geneva, Switzerland. Heard at the beginning of September in the afternoons, now off the air. (Lee, McKinnon.)

HBL.—14,535kc., 20.64m., same location. This one heard at the same time as HBO. (Lee, McKinnon.)

PCJ.—9590kc., 31.28m., Huizen, Holland. Comes in very well on Monday and Wednesday mornings till 6.30. (Ford, Sullivan, Emery.)

PCJ2.—15,220kc., 19.71m., same location. On opening at 10.40 p.m. is good, but heard best on Tuesday afternoon in special Australian session. (Lee, Ford, Battis, Cox, Clack, Medina, Marks, Foster, Emery, Dun.)

PHI2.—17,770kc., 16.88m., same location Another of the Philips stations heard around 11.0 p.m., but not very strong. (Ford, Lee.)

SBP.—11,705kc., 25.63m., Motala, Sweden. In the mornings is still quite loud till closing at 7.15. (Gaden, Emery.)

SBU.—9535kc., 31.47m., same location. Another station opening at 7.15 a.m., but interfered with by WGEO and DJN.

ZRH.—6007kc., 49.94m., Robert's Heights. This South African can still be heard in the mornings at about 6.0. (Foster, Gaden, Ford.)

TPZ3.—8960kc., 33.48m., Algiers, Algeria. The North African station now comes in very well in the mornings, and gives news in German at 6.30, followed by French at 6.50, closing at 7.0. (Foster.)

YUA.—6100kc., 49.18m., Belgrade, Yugoslavia. Can still be heard in the mornings, but now very noisy. (Medina, Ford, Dun.)

YUC.—9505kc., 31.56m., same location. This station is now one of the best on the 31-metre band in the mornings around 7.0, and gives news in English around 7.20 (Lee, Medina, Marks, Gaden, Foster, Dun.)

TAP.—9465kc., 31.7m., Ankara, Turkey. Still very loud in the mornings. On Sunday morning gives English session around 6.15. (Lee, Ford, Medina, Battis, Foster, Dun.)

TAQ.—15,195kc., 19.74m., same location. This one is quite strong on Saturday nights at 10.30. (Clack.)

EAQ.—9860kc., 30.44m., Madrid, Spain. This Spaniard is very good in the mornings around 7.0. (Foster, Lee.)

Radio Malaga.—7220kc., 41.55m., Malaga, Spain. Another Spanish station which opens at good level at 6.30 a.m.

LKQ.—11,735kc., 25.57m., Oslo, Norway. Now very much weaker, but still audible in the mornings around 7.0. (Foster.)

LLG.—9610kc., 31.22m., same location. Only heard on two occasions with same programme as LKQ. (Foster.)

ZAA.—6085kc., 49.3m., Tirana, Albania. On some mornings can be heard till closing at 7.15.

LZA.—8500kc., 35.29m., Sofia, Bulgaria. This one was heard very well until shortly after the war started, but is now silent. (Sullivan.)

IABA.—9650kc., 31.09m., Addis Ababa. This Ethiopian station opens at full speaker strength at 1.0 a.m.

EAJ43.—10,360kc., 28.96m., Teneriffe, Canary Islands. On some mornings can be followed at fair level.

CR7AA.—6137kc., 48.88m., Lourenco Marques, Mozambique. Can still be heard in the early morning, but rather noisy. (Ford, Emery.)

HAS3.—15,370kc., 19.52m., Budapest, Hungary. This station, which is called "Radio Labor," is heard on Sunday nights only, opening at midnight.

ORK.—10,330kc., 29.04m., Ruysselede, Belgium. On one morning at 6.0 we heard an announcement in English, which is unusual for this station.

RUSSIA

RNE.—12,000kc., 25.00m., Moscow. This Russian has been heard at good strength at 7.0 a.m., but is weaker at time of writing. Also gives news in English at 6.0 p.m. (Lee, Ford, Medina, McKinnon, Battis, Gaden, Clack, Foster.)

RV96.—15,410kc., 19.47m., same location. In the mornings gives news in English at 6.15, and is also heard with Russian programme at 8.0 p.m. till 9.0 p.m. and later. (Ford, Battis, Lee, Gaden, Foster.)

RV96.—15,180kc., 19.76m., same location. Still being heard in the afternoons with musical programme. (Marks, Gaden, Lee, Ford, Clack, Dun.)

RV96.—9520kc., 31.51m., same location. Comes in at very good strength between 6.0 a.m. and 7.0 a.m. (Medina, Ford, Foster, Lee.)

RV96.—6030kc., 49.75m., same location. Heard in the mornings at 7.0, and on Sundays gives news at 8.0 a.m., but very weak and noisy. (Medina.)

NEW AMERICAN CALL-SIGNS

VERIFIED LIST

Since the U.S.A. stations commenced using their new call letters various combinations have been published by our contemporaries, quite a number of which have proved to be incorrect. We are very gratified to find that with one exception, all those shown in Radio & Hobbies have now proved to be correct. As we have now heard all the new calls of the active stations with the exception of W4XB we list them below for our readers' convenience.

WBOS, formerly W1XK, Boston, Mass.

WRUL, formerly W1XAL, Boston, Mass.

WGEA, formerly W2XAD, Schenectady, N.Y.

WGEO, formerly W2XAF, Schenectady, N.Y.

WCBX, formerly W2XE, New York, N.Y.

WNBI, formerly W3XL, New York, N.Y.

WRCA, formerly W3XAL, New York, N.Y.

WCAB, formerly W3XAU, Philadelphia, Pa.

KGEI, formerly W6XBE, Treasure Island, Cal.

WPIT, formerly W8XK, Pittsburg, Pa.

WLWO, formerly W8XAL, Cincinnati, Ohio.

WRUW, formerly W1XAR, Boston, Mass.

THIS MONTH'S VERIFICATIONS

MTCY.—6125kc., 48.98m., Hsinking, Manchukuo. We have just received a very nice letter from Mr. K. Funada, of this station, verifying our report of last June. The delay being due to lack of correspondence facilities. He also advised that printed verification forms would shortly be available. Our report was the first they had received from Australia.

2RO6.—15,300kc., 19.61m., Rome, Italy. From the Italian station we received their usual attractive card, verifying our recent report to them. In addition, they sent their programme booklet, which contains a wealth of interesting information re the Italian stations.

CD1190.—11,910kc., 25.19m., Valdivia, Chile. This station verified our report after many months waiting, but it was none the less acceptable when it did arrive. In addition, they also sent us the first copy of their official organ, which, despite the fact of being printed in Spanish, contained some useful information about the various stations in this South American country.

W2XUP.—25,700kc., 11.67m., New York, N.Y. We were very pleased to get our verification for this U.H.F. Facsimile transmitter in the form of a double folder card, showing radio towers, etc. This is the first verification of a facsimile station which we have heard of in this country. They state that frequency is now 25,250kc., with power of 100 watts. Station owned by WOR at 1440 Broadway, New York.

by Barry Kent

MAGIC AND MAGICIANS

AUSTRALIAN ELUDES NAZIS!

SPEED BEFORE MAGIC!

Those of you who know Murray, the Australian escapologist now successfully appearing in England, will be surprised to learn that he recently performed the greatest escape of his lifetime.

He escaped from Germany on a bicycle just a few hours after war had been declared. In a dash for the German-Danish border, he was accompanied by an English girl, who was an assistant in his company.

One bicycle for two riders with a fair amount of luggage must have been hard going. However, Murray and his assistant made it, after a five hours debate with German troops, and were allowed to pass into neutral territory.

Only a few weeks before that he was appearing at the Wintergarden Theatre, Berlin, where Hitler and party attended the opening performance. Murray carries about twenty tons of illusions for his magical production. He appeared in Australia in 1927, and was well-known all over the world as a great escapologist. Later on, he added general magic and illusions to his act.

JIMMY WALLACE RETURNS

You remember young Jimmy Wallace? Jimmy wrote an article for us, you will remember, in the June issue this year on juggling.

He has just returned to Sydney after a very successful tour of Victoria and South Australia. Jimmy called in to see me during the week and to tell me of his wonderful trip. He appeared at the following theatres in Melbourne: The Princess, The Kings, The Lyceum, and the Apollo, while at Adelaide he appeared at The Regent, The Tivoli, The Majestic, The York, and at a special performance in John Martin's store. The principal country theatres were also visited.

Press reports regarding his act are full of praise for 16-year-old Jimmy. One paper said of his act: "There are acts and acts. We have seen many first-class jugglers, but this fellow beats them all. Jimmy is appearing at a theatre where only international acts appear, except in rare cases—Jimmy is one of these rarities."

He is the only radio juggler in Australia, having appeared for twelve leading stations at various times.

Truly, this is a wonderful record for a boy of 16 years, and Jimmy is a keen reader of "Radio and Hobbies," too.

NEWS OF CARDINI

Last-minute news just received announces the birth of a baby daughter into the home of Mr. and Mrs. Cardini, of New York.

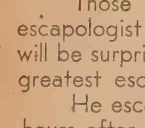
Cardini, as you are well aware, is the world's greatest card manipulator. Cardini was in Australia some years ago and appeared at the leading theatres. Since then he has improved his act to the stage where he has no rivals in any part of the world.

News just received from London tells me that the Great Levante, Australia's Own, will visit Australia professionally early in 1940. Further particulars will be given in our next issue.

There is an old proverb, which anyone thinking of exposing a trick would do well to remember: "To tell our secrets is often folly, to communicate those of others is treachery."

BREATHE THE MAGIC WORD

This is an astounding trick to show your friend. Take a piece of French chalk and write his name on a mirror. Then take a soft duster and wipe it off. When your friend comes in, tell him that your magic mirror knows his name. Ask him to breathe on the mirror . . . and . . . hey Presto! . . . to his surprise, his name will appear on the mirror as if by magic.



Hey, Presto!

Abracadabra!

Business as usual. Magic as usual.

Christmas is coming and everybody is getting ready with new tricks and stunts to add to their programmes for the busy period ahead. Many of the Sydney magicians have already booked excellent dates for Christmas functions this year. Now is the time to think about adding some novel trick to your programme.

Many opportunities will be found for young magicians to entertain at soldier's functions. It may be a good idea to include silk flags instead of silk handkerchiefs in the various tricks where silks are used. The use of a Union Jack or an Australian flag in your act will be welcome at such entertainments. Other similar introductions of a patriotic nature will suggest themselves to you.

A number of magician writers have asked me to include more difficult tricks in this monthly article. Several have asked me how to saw a young lady in two, others have asked me how thought reading is done on the stage, and some ask how Chang and Nicola do certain tricks.

Now, I think you will agree with me that it would not be fair to professional magicians if I were to divulge their secrets in a magazine with a large circulation like "Radio and Hobbies." The main object of the various articles I write is to stimulate interest in magic as a hobby, and not to divulge to partly interested persons the secrets of the professional magician. Nevertheless, if you are a magician, either professional or amateur, a written request for various methods of doing certain tricks will be dealt with according to the circumstances of each case. In some instances, it would take up a considerable amount of space, either in print or in writing to explain satisfactorily how different tricks are done. In these cases, I may be able to suggest the name of a book with a complete explanation of the particular trick.

So, as Dante would say—until next month——

Sim Sala Bim.

Cheerio,

Barry Kent.

THE UNCANNY ART OF THE ESCAPOLOGIST

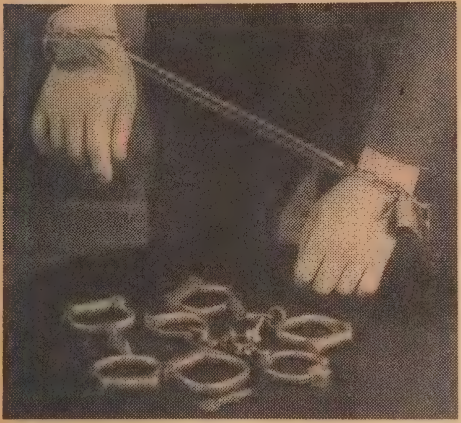
Houdini's Marvellous Feats

No doubt you have read stories of clever people being able to escape from gaol, escape from handcuffs, leg-irons, straight-jackets and other such forms of punishment. If you have, such words as "handcuff king," "picking locks," "buried alive," "nothing can hold him," and many others will come to your mind.

With all these phrases, and with this form of entertainment there is one word that will always live, and that is **HOUDINI**, for it was he who so firmly established himself and Escapology in the minds of people of all countries.

HUNGARIAN WIZARD

Houdini's father and mother came from Hungary to America where young Houdini was born on April 6, in 1874. He died in America on October 31, 1926, at the age of 52, after having been an Escapologist and magician for forty-three years. His correct name was Ehrich Weiss.



Demonstrating the CHINESE WRIST SHACKLES, a baffling escape. Two solid steel chains are examined and securely attached to the ends of a heavy metal bar. The chains are then padlocked to the two wrists of the performer. The padlocks may be provided by members of the audience, and the keys retained after locking. Locks may even be sealed with wax if desired. In a matter of seconds only, an experienced performer escapes and immediately hands the complete equipment for examination.

Australia has given us a number of performers who have specialised in this branch of magic. There is at present appearing in England an Australian, **MURRAY**. There is Gilbert, now retired from the stage and living privately in Sydney. Gilbert, for many years, appeared with Wirth's Circus and toured the East with them. He, too, presented an unusual series of escapes, and it was true of him "nothing can hold him."

"LES" LEVANTE

Then there is LEVANTE, who will appear in Australia in the new year. "Les," as he is so popularly known, to his many friends here and all over the world, presents an escape which he has called "The £1000 Trunk Escape," in this, he is assisted by his charming daughter, Esme. I will keep you fully advised about his great show as time progresses.

There have been many forms of escape tricks presented from time to time by the many performers who have specialised in this form of entertainment. There is the ordinary escape from handcuffs, which is considered by those who can do it, to be quite easy. Then there are escapes from leg-irons, straight-jackets, iron boxes, bank safes, mail bags—tied and sealed, riveted iron boilers, milk cans filled with water, and many others of similar nature.

How is it all done? That is the question that comes to thousands of minds. It is baffling. Then, so are the other forms of entertainment presented by the skilled magician. Escapology is perhaps the most difficult form of entertainment of all phases of magical art.

PHYSICAL CONDITION

The performer specialising in escapology needs to be in excellent physical condition. He needs to have good breath control and powers of endurance not necessary to other performers.

For those who would like to know a few escape tricks to add to their programmes, without the need of handcuf straight-jackets, etc., I would recommen these: Chinese Wrist Shackles esca usually sold at about 4/6; The Sla Bangle escape, about 2/6; The Siberia Chain escape, about 3/6, and Fing Trap escape, about 6d each. The pric I have mentioned are only approximat They are quoted merely to give you a idea of the price. Most magical deale are in a position to supply these article

Houdini had a great fondness f escapes from rope-ties, and was, course, a brilliant expert in this a He had mastered the art of tying an untying knots. When BEING BOUN UP, he knew how to gain subtle advan tages without the knowledge of tho who were securing him.

"THUMB TIE"

A clever thumb tie, is known as th Ten Ichi tie, and is featured by the gre Levante. "Chang" also performed th trick whilst in Australia. The perform starts by inviting two members of th audience to tie his thumbs together wit

Continued on Page 65.

FUN FOR ALL

Mystic, Uncanny Windmill, 9d; Wrigla Golf Ball, 2/6; Boat Puzzle, 6d; Snake From Flower, 1/-; Finger Thru Hat, 1/-; Sore Finger Joke, 6d; Metal Puzzles, 1/- Box; Red Snapper Puzzle, 6d; Joke Cigarette Cases, 9d; Exploding Boot Polish Tin, 2/6; Squirting Cigarettes, 9d pkt.; Squirting Coat Badges, 9d; Joke Cigars, 1/-; Beer Beetles, 6d pkt.; Bed Bugs, 6d pkt.; Funny Kinema, 2/6 ea.; Flies on Pins, 1/3; Gundagai Dogs & Pills, 1/9; Wobbly Matchbox, 1/6; Joy Buzzers, 3/-; Joke Skulls, 9d; Rubber Daggers, 1/-; Joke Ink Bottles, 9d; Rubber Chewing Gum, 1/-; Snake From Jam Pot, 9d ea.; Broken Egg Joke, 1/6; Cow Voices, 1/6; Trick Padlocks, 2/-; X-Ray Tube, 1/-; Joke Spider, 1/6; Exploding Matches, 1/6; Paris Views, 6d; Window Smashers, 1/6.

THROW YOUR VOICE

into a trunk, under the bed—anywhere.

TAKE ME OUT!! HELP!! LOAFER

THE VENTRILO

An instrument fits into the mouth; cannot be detected. With the aid of this double throat, or VENTRILO, you can imitate birds, animals, etc. Everything for ONE SHILLING, including a FREE booklet giving you full instructions how to become a Ventriloquist and throw your voice.

70 Simple Card Tricks, 1/6; New Tricks and Stunts, 1/6; King Pack of Cards with 25 Mystifying Tricks, 3/6; Cigarette Thru Hank., 2/6; Wine and Water Illusion, 3/6; Obedient Block, 2/6; Bewildering Blocks, 6/-; Ghost Tube, 4/6; Egg Bag, 3/6; Prayer Vase, 3/-; Trick Card Box, 3/6; Ball Vase, 2/-; Magic Billiard Balls, 3/6 set; Handkerchief To Egg, 2/6; Rising Wand, 4/6; Nail Thru Finger, 1/-; Card To Matchbox, 6d; Coin Vanish in Glass, 6d; Jumping Peg in Bat, 6d; Phantom Cards, 6d; Pick-It-Out Card Trick, 1/-; Imp Bottle, 1/-; Color Change Hank., 3/6; Anti-Gravity Glasses, 2/6; Hindu Turban Trick, 3/6; Chinese Rice Bowls, 4/6; Chinese Linking Rings, 7/6.

FREE My surprise Catalog, full of Comical Jokes, Amazing Stunts, Magic Tricks, Startling Puzzles, Fascinating and Amusing Novelties from every part of the world. Send now for this catalog.

WILL ANDRADE
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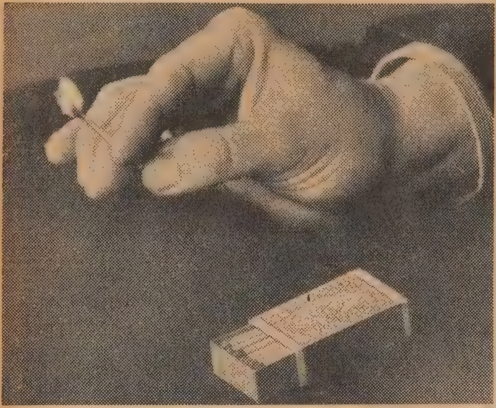
TWO EASY TRICKS FOR YOU TO TRY!



BLOW! BLOW! BLOW!

Hold a burning wooden match as shown, after having lit a cigarette if you wish—then blow down the OTHER coat sleeve and mysteriously the match goes out.

NOW. As you blow down the sleeve, the eyes of your audience will be directed to your action momentarily . . . at the same time give the match stick a "flick" with your forefinger nail as shown. This will extinguish the flame quickly. The thumb nail may be used if found easier.

THE HOCUS POCUS GLASSES

TRY THIS ON YOUR FRIENDS.

Place three glasses in a row, with the centre one upsidedown. PROBLEM: Pick up the glasses TWO AT A TIME, and after THREE TURNS, have all the glasses BOTTOMS UP. SOLUTION: First move—turn over glasses 2 and 3. Second move—turn glasses 1 and 3. Third move—turn 2 and 3 again . . . and . . . Hey Presto . . . you will find ALL BOTTOMS UP.

WRITING SECRET MESSAGES

Here is a simple way of writing invisibly.

First of all, soak a piece of paper in water, and place it on a sheet of glass. Then place a dry piece of paper over it and write your message on this with a blunt pencil.

Now allow the wet piece of paper to dry, then send it to your friend, who is also in the secret.

On receiving it, your friend will soak the paper in water, and will then be able to read your secret message. Try it out.

THE BALANCED CARD

A card freely shown is balanced on the palm of the hand. This is accomplished by means of a short length of fine black thread attached to the coat sleeve by means of a black pin. The end of the thread contains a pellet of wax, attached to the front button of the coat.

Show the card and attach the end of the thread to the top of the card by means of the pellet of wax. Now it will balance on the palm of the hand quite easily. Pick up the card with the other hand and secretly remove the wax, and immediately throw the card out for examination—thus proving it to be unprepared.

Simple—When You Know HOW, Card Trick.

Place an empty hat or white handkerchief on the floor and then ask your friend to stand directly over it and try to drop one card at a time, in to the hat or on to the handkerchief. The cards should be dropped from about waist high.

Most of the cards will go on the floor, and miss the hat or handkerchief. YOU CAN DO IT. The cards should NOT be dropped by holding them perpendicularly. Hold them horizontally before dropping. EASY!

WHO'S WHO IN MAGIC

ALI RAHJA

Ancient Egypt has given us many great wizards and sorcerers. The secrets of the "miracles" then recorded are revealed by a study of the modern survivals of these very tricks of Magic.

Even after nearly six thousand years, Egypt to-day still gives great magicians. Egypt, the land of the Great Pyramids!

And so, we introduce a great Egyptian Magician—ALI RAHJA.

Ali Rahja is at present touring in New Zealand, where he is very popular and most successful. Local magicians should not fail to see his quaint magic when he visits the various cities.

He is very skilled in close-up sleights, and it is here that the magician enthusiast mostly will appreciate his rare ability. His magnetic personality and colorful costuming never fail to attract. Flashing eyes, and a deep sonorous voice truly remind one of ancient Egypt. It was on the Sydney Showground that I first saw him a few years ago. His ability amazed me. In addition to being a capable magician, his great secret is in his acting ability and superb showmanship, plus all the other qualities which go to make a successful magician.

His training and past experiences in the realm of magic are unique. He has appeared in various parts of the world with other great magicians, including the great American performer, Blackstone. Blackstone in America to-day has perhaps the most outstanding magical touring company and mystery show. Ali Rahja also appeared with the celebrated mind readers and illusionists Aleko and Panthea, known all over the world as mental telepathists.

ALI RAHJA

Ali Rahja is also a skilled astrologist and is doing excellently at present in New Zealand. His sessions in this connection are given per medium of Radio. We are hoping it will not be long before Australia will see him again.

If he calls your way, I feel sure he would be glad if you were to "drop in" for a talk about magic and magicians. His knowledge of both is wide and most interesting.

R. & H. MAGICIAN

Magician W. J. Dicker, of Gladstone, Queensland. Also a keen reader of "Radio and Robbies." He is clever amateur magician and has given quite a number of performances at various functions. He would like a few penfriends, who are interested in Magic as a hobby. His address is Glenlyon Street, Gladstone, Queensland.

WHAT MAGAZINES DO MAGICIANS READ ?

Frequently I have been asked the above question by my readers. Here is a brief list of magical magazines obtainable in Australia: "The Imp," "The Sphinx," "The Tops," "The Linking Ring," "The Genii," "The Magician," "The Magic Wand," and the New Zealand magazine, "Te Tohunga," all of which contain the latest magical news and tricks from the four corners of the earth.

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Quickly & Easily!

Throw Your Voice—Amuse Your Friends! Make Money!

NEVER before have the secrets of ventriloquism been offered to the public. Now for the first time YOU can learn to throw your voice. You can get endless fun from ventriloquism, you can amaze the "wise ones." Send for this startling FREE literature and within 24 hours you will know many of the secrets of ventriloquism.

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107 Pitt-street,
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Dear Sir,—Send me by return post your FREE LITERATURE all about Ventriloquism. Enclose stamp for postage.

NAME ....

ADDRESS ....

.... 1/11/39.

Magician's Outfit
GET YOURS
FREE
OF EXTRA COST

YOU can become a highly skilled conjurer — amaze you friends—earn money i your spare time! Yo learn quickly an easily in your ow home. Why remain nobody? Get out o the rut—lead the wis ones up the garde path, and then sho them how easily yo can do it.

I offer you a complete conjurer's outf FREE—all apparatus and materials. You Ca Earn from £5 to £20 a week as a Magician There is a great demand for entertainer everywhere. Now is your chance to be "dif ferent" from the rest—to raise your popu larity and earn good money. Secrets of Magi Revealed at Last! You learn 250 tricks an stage illusions — you can do them yoursel before your friends and acquaintances.

"HOW TO BECOME A MAGICIAN
IS FREE !

THIS startling book has been the turnin point in hundreds of lives. No book o its nature has ever been offered before; gives you the inside information on conjuring, sleight-of-hand, illusions, card and other tricks, etc. If you never read another book in your life you must read this one. It will amaze you with its possibilities and the vast field it opens up to you. Get that Coupon in the post NOW before it's too late, and read something that is going to startle you! But please hurry!

TEAR — MAIL NOW!

HERBERT HOLMES, Dept. 27,
School of Magic, Lombard Chambers,
Pitt Street, Sydney.

Dear Sir,—Please send me your FREE Boo "How to Become a Magician." I enclo stamp for postage.

NAME ....

ADDRESS ....

.... 1/11/3

LET YOUR FILMS TELL A STORY

Spring sunshine
beckoned us out
one morning!

A title such as this is the essence of simplicity, and yet it could usher in a dozen different subjects.

Home movies are not seen to their best advantage without intelligent editing and titling. Even the scrappiest collection can be made interesting with the aid of suitable titles. This article shows you how easy it is to arrange and present your shots to best advantage.

By FRANK EASTMAN

HAVE you tried titling your films? We don't mean writing out a series of titles on a sheet of paper, sending them along to the cine gent, and having those titles returned hotographed on a strip of film. That's ie lazy and rather expensive way. In-dentally, it is robbing your hobby of alf of its fun.

Making titles can be as fascinating as ie actual filming.

Just as you can express your own per-onality in your pictures of "motion" lming, so you can bring your own indi-duality to your titles. Indeed, well-ritten, artistically planned titles can ake a poor film passable, and a good lm excellent.

ASY TO ARRANGE

Apart from being great fun, it is so asy. And the ramifications of this ranch of filming are endless. This onth, we propose to deal only with the mplest forms of titling. We suggest that you have any odd lengths of film, ou should experiment with these mpler forms, and it is almost a cer-inty that before long, you'll be turning our attention to the more elaborate and dvanced methods of naming your pic-ures.

Titles are as necessary to a film as a over is to a book. Nothing annoys a ovie audience so much as to be shown a hotchpotch of flickering scenes, strung together without rhyme or reason. The complete reel should have an opening, a credit, and a closing title, together with explanatory sub-titles prefacing the various shots.

Before we commence on the actual making of the titles, there are a few points to remember. A careful survey of these will save much worry and expense of film.

Keep your titles telegramically terse. Long-winded, "literary" titles are not only a bore to read, but are clumsy and awkward to fit into the required screen-space. Therefore, write your title in long-hand first on a sheet of paper, then prune it ruthlessly. For instance, quite recently we had occasion to fit an explanatory title to a film taken in Burragorang Valley. We started out with a title like this—

"Burragorang" takes its name from a tribe of aborigines, who originally inhabited the valley, and the English translation of the name means "A hunting place."

That is explanatory, but far too long and clumsy. After repeated blue-pencillings, the title came down to this:—

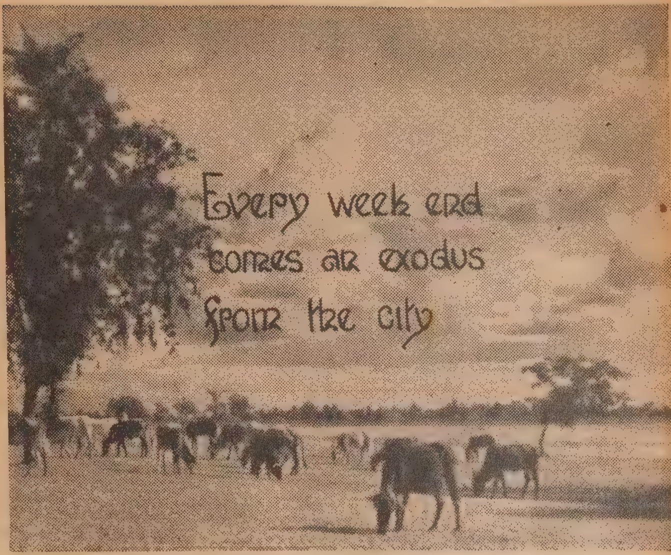
"Burragorang—'hunting place,' so called by a tribe of aborigines originally inhabiting the valley."

This title contains all the information necessary in just half the words. It is easier to read, easier to remember, and certainly easier to fit in the confined "screen-space" of your film.

USE YOUR HEAD!

Again, beware of the "tip-off" title. Try to avoid giving information in a title, and repeating the same information in the pictures that follow. For instance, if Jane and Joe and Kathleen are shown lighting a camp fire and preparing a meal, it is merely a waste of time and film to put the title, "Jane and Joe and Kathleen then started to prepare a meal" before that particular sequence. It must always be remembered that the only excuse for titles is that they must clarify a point. They should be used to prevent your audiences saying "Who's that?" or "Where was this taken?" or "However did you get to this place?" The perfect film should be titled so as to be quite self-explanatory; there should be no need for questions or for any running commentary from the operator.

Titles are invaluable for bridging awk-



Another effective prelude to some country scenes.

ward lapses in continuity. How often have we seen amateur films, in which a young lady starts out for a walk in a pair of slacks and a jumper, and five minutes later appears in a pair of tennis shorts and a coat. Obviously, what has happened is that the second sequence was photographed on another day or another month. Very well. Slip in a title to explain this, and you will save your audience considerable bewilderment.

OPEN AND CLOSE

Finally, opening, closing, and credit titles are not only a neat conceit on the part of a filmer, but are necessary to prepare your audience for the pictures that follow. Nothing is more annoying for an audience than to have the lights switched off and to be straight away shown a number of dancing pictures, unknown figures, that posture against backgrounds and locations completely unidentified. These run their course until a blank white screen announces that the film has run through.

Compare this with the effort of the careful showman. After the lights are turned down, and the projector starts to hum, the opening title, artistically prepared, fades on to the screen. It is of such quality that at once the audience's interest is aroused, and as they look forward to what is to come, the second title, "Photographed in color by John Smith," appears. Now their attention is focussed unitedly on the screen, and when the third or explanatory title, appears—it may be, "We take you on a colorful journey through the Blue Mountains," &c., &c.—the audience is settled, interested, and looking forward to seeing the pictures that are to follow. And when the film is complete, and the words "The End" flash on to the screen, it gives them time to readjust their minds to reality, so that the turning up of the lights is no shattering interruption, but the finale of a very successful evening.

Therefore, whatever may be said of "in-between" titles, opening, closing, and credit titles are a necessity.

TWO METHODS

There are two ways in which you may make your own titles. The first—and easiest—is to purchase a titling easel for your particular make of camera, which should cost, roughly, 30s, while the second is to draw and print your titles on large sheets of paper, and photograph them direct. As explained, the easel gives the best results, since such details as focussing and centreing are mechanically perfect. Again, it is cheaper. Titles made on the easel are lettered on pieces of paper, 2½ by 3½ inches, while titles without the easel must be drawn on draughtsmen's sheets of at least 18 inches by 12 inches.

THE EXPERT!

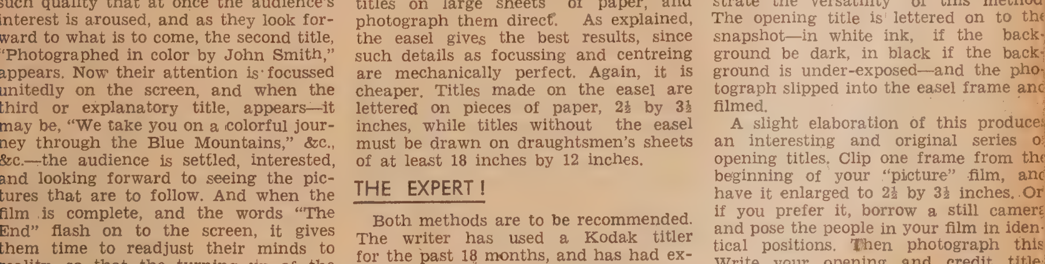
Both methods are to be recommended. The writer has used a Kodak titler for the past 18 months, and has had excellent results. On the other hand, James Sherlock, Australia's ace amateur cinematographer, uses nothing but direct photographing of titles. He has a skilled title writer prepare his titles on large sheets of paper. A slight advantage of this latter method is that it allows more wording and an elaboration of art-work on the larger sheets; on the other hand, some experience is necessary in focussing and lighting such a large area of title.

With the easel, however, ordinary snapshots, 2½ by 3½ inches, can be utilised as artistic title backgrounds. Some of the illustrations on this page demonstrate the versatility of this method The opening title is lettered on to the snapshot—in white ink, if the background be dark, in black if the background is under-exposed—and the photograph slipped into the easel frame and filmed.

A slight elaboration of this produces an interesting and original series o opening titles. Clip one frame from the beginning of your "picture" film, and have it enlarged to 2½ by 3½ inches. Or if you prefer it, borrow a still camera and pose the people in your film in identical positions. Then photograph this Write your opening and credit titles across the face of the snapshot or the enlargement, place it in your easel, and film it in the ordinary way.

When the film is processed, clip the title strip and splice it on to the main reel. When projected, the figures on the screen will remain inactive until the title is whipped away, when they take up the normal course of action into the sequence of the film.

(Continued on Next Page.)



Simple suggestions of a type widely applicable to all kinds of films.

LET YOUR FILMS TELL A STORY

(Continued from Previous Page)

Colour film brings all manner of possibilities to titling. With polychromatic filming, it is advisable not to use photographs, unless they are slightly out of focus. Otherwise, the wealth of colour in the background will draw the eye away from the lettering, and make for confusion.

DECORATIVE BACKGROUNDS

On the other hand, decorative patterned backgrounds give pleasing contrast to the lettering, and there is no end of variety here. Wallpapers are excellent for this, as is the wrapping paper of silver and gold design used by many stores. Contrasting inks should be used to make the lettering stand out. With colour film, it is likewise possible to harmonise title backgrounds with the main colour theme of your film.

For instance, if your colour film is a story of lazy green seas, undulating under blue skies, then blue backgrounds to your titles would be a perfect accompaniment to the action, with no jarring colour note to distract the eye as it moves from title to picture. If, on the other hand, your film is about sunny streets and yellow buildings, then the appropriate background for your explanatory lettering would be a warm brown or deep yellow.

Make your opening credit, and end titles as elaborate or as colourful as you please. But once your film gets under way, keep the intervening titles as simple and as free from decoration as possible. If using an easel, the best intervening titles can be made on an ordinary typewriter, provided the type is sharp and clear, and a new ribbon is used. There is one exception to this rule. Tiny, simple, single line drawings, pertaining to the title, may be used in one corner of the sub-title, if you so wish. But never, never use any illustrative matter of any kind on a spoken title.

SUNLIGHT FILMING

While many amateurs use artificial lighting to film their titles, this writer relies on sunlight. Under a bright sky, using an f 8 aperture, sunlight gives flat uniform results that are very pleasing. If, however, you wish to use indoor illumination with your easel, load your camera with ordinary panchromatic film, and use a 100-watt lamp with your camera at an aperture of 5.6. Hold the lamp over the top of the camera, and see that the title is evenly illuminated.

Colour titles should preferably be filmed in direct sunlight, but if filmed under artificial light, remember that a special type of film is necessary to retain the correct colour values. If using a typewriter to write your titles, be sure that the colour of the ribbon contrasts sufficiently with the title card to make the printing legible. The following colour combinations have been found to be the most effective:—

Black typing on any light or bright-coloured card.

Brown on tan, yellow, light green or blue.

Dark blue on yellow, tan, or light blue.

Purple on yellow, light green or blue.

These instructions, fundamental as they are, should give you excellent titles for your films. Elaborations of the above will give you surprising and interesting results, but these must wait for another article. In the meanwhile, try some titling for yourself. You'll be surprised how fascinating the task can be, and how you can stamp your films with your own individuality through a little time and patience.

PHOTOGRAPHY
The greatest hobby of them all

No other hobby can offer so much all-year-round enjoyment as Photography.
There's something personal about Photography, too; a pride of achievement when you see those shots come up . . . and there's a great satisfaction being able to keep a record of all those interesting things you see.

Ensign
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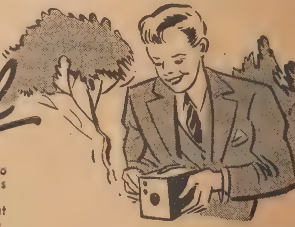

For 8 pictures 2¼in. x 3¼in., or 16 pictures 1 5-8in. x 2¼in. All-metal body. Brilliant view finders. T. and I. shutter. Ensign All-Distance Lens. Double exposure prevention device 12/6

ALL-DISTANCE 20
A de-luxe model for 8 pictures, 2¼ x 3¼ inches. Built-in Colour Filter. Similar to the E20 .. .. .19/6

The Ensign
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All-metal with All-Distance lens in two position focussing mount . . . . close-ups can be taken from 3ft. Time and instantaneous exposures. Lever-operated shutter with spring return. Hinged back. Gives 12 pictures, 2¼in. x 2¼in. on Kodak V120 Roll Film. Finished in modern black ripple enamel, with leather sling strap. Price
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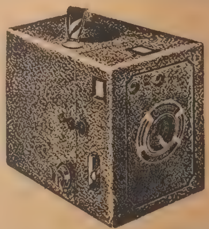
Coronet
BOX CAMERAS



The type of camera that is really appreciated. Takes 8 pictures 2¼in. x 3¼in. on a No. 120 Film. Fitted with British made Meniscus Lens, time and snapshot shutter, two brilliant finders, leather handle, and nickel-plated winding key.
Price 8/6
E.D. 16.—Every Distance model with built-in Colour Filter. Takes 8 pictures 2¼ x 3¼ inches and 16 pictures 2¼ x 1⅝ inches. Price 15/-

OF ALL HARRINGTONS DEALERS AND—
Harringtons PTY. LTD.
386 GEORGE ST., SYDNEY

Multi-Vibrator

(Continued from Page 23)

APPLICATION OF MULTIVIBRATOR

As will readily be appreciated, such an instrument cannot be calibrated in terms of frequency, and consequently cannot be used for aligning I.F. transformers or calibrating dials in terms of frequency. It is, however, extremely useful for aligning the tuned circuits, especially on the short-wave bands.

Having once set the oscillator trimmer to a satisfactory position (at the high-frequency end of the band), the output lead of the multivibrator may be connected to, or brought near the aerial terminal of the receiver, and the signal frequency circuits then aligned for maximum output in the speaker.

The receiver may then be tuned to the low-frequency end of the band, and the padder adjusted for maximum output. It is unnecessary to rock the gang condenser, since with the multivibrator in operation, there is always a signal present, no matter to what frequency the receiver happens to be tuned. After adjusting the padder, the aerial and R.F. trimmers should be rechecked at the high-frequency end of the band.

Another important advantage in the use of a multivibrator is that it is possible to check, quickly and easily, each wave-band in a receiver for dead spots or variations in sensitivity by the simple expedient of listening to the output from the multivibrator, as the receiver is tuned across each band. The output from the multivibrator falls gradually with rising frequency, but does not vary greatly from point to point.

TELEVISION IN COLOR

(Continued from Page 11)

mitting end. A high-intensity arc lamp replaces the photo-electric cell, and the light, after passing through the scanning disc, is modulated by a large Kerr-cell.

The disc is identical to that used for transmission, so that when the red component of the picture is received the light is passed through its appropriate portion of the color combination on the disc. The receiver screen is then scanned by a mirror drum, again of similar type to that employed at the transmitter.

The apparatus used for the demonstration on July 27, as far as the transmitting side goes, was similar to that just described except for the fact that the method of spotlight scanning was employed. Fig. 4 will show the broad outlines of the arrangement in which, instead of an image of the subject being thrown on to the disc, the subject is scanned with light spots of varying color according to the filters on the disc, the light reflected from the subject being picked up by color sensitive cells. The drum used has thirty-four facets and revolves at a speed of 6000 revolutions per minute.

The great advance that has been made in the apparatus is that a cathode-ray tube is used at the receiving end. Hitherto, the mechanical gear employed has been exceedingly cumbersome and prone to mechanical breakdown, whereas with the cathode-ray tube both these disadvantages have been done away with.

The arrangement of the apparatus will be seen by reference to Fig. 5. A normal projection cathode-ray tube, similar to that employed in the apparatus installed in several London cinemas, may be used.

In front of this tube there is arranged a disc with apertures covered by the same filters as those used on the transmitting discs. The picture viewed through this disc consists of a 102-line blue-green picture superimposed upon a 102-line red picture, the net result being a 102-line picture in natural colors.

The frame frequency of the picture is 16 2-3 per second. The size picture shown was 3ft. square approx. This does not constitute the limit of picture size, but was convenient for the size laboratory in which it was shown. Neither does the fact that the transmission was from the Crystal Palace, only two miles away, imply that the system has only a limited range.

It cannot be too strongly emphasised that the above-described demonstration must be looked upon as an experiment at present, and it can be stated with complete assurance that there is no likelihood of any alteration being made in the official service for some time to come. This does not, in the writer's opinion, mean that no use will be found for this system of color television, since the demonstration showed clearly the potentialities of the apparatus for large screen work in cinemas and the like.

ESCAPOLOGY

(Continued from Page 59)

a short piece of string, and then offers his hands for examination.

A small wooden hoop—examined—is then thrown to the performer, who catches the hoop on his arm, with the thumbs still securely tied. This can be repeated with any number of hoops, without any cover of the hands at any time, and without turning the back to the audience. It is a baffling escape from a thumb tie. The trick may be varied in several ways, one by causing the arm to be linked with those of his assistant. At all times the thumbs and string may be examined and found tightly tied.

Another escape that attracts much attention is the UNDER WATER escape, in which the performer is usually handcuffed with several pairs of handcuffs, and then placed in an examined packing-case and nailed down by representatives of the public. The case is then lowered into the river or harbour and completely submerged. In less than a few minutes, the magician is seen to be sitting on top of the now floating box—escaped from handcuffs and box. This particular escape was popular with Houdini, and is considered by many as his most mysterious accomplishment.

GREAT MAGICIAN DIES

IT is with great sadness and regret that we have to record the recent death of Horace Goldin in England. Truly, one of the greatest magicians of all time, a name which will go down in history as a leader of his chosen profession.

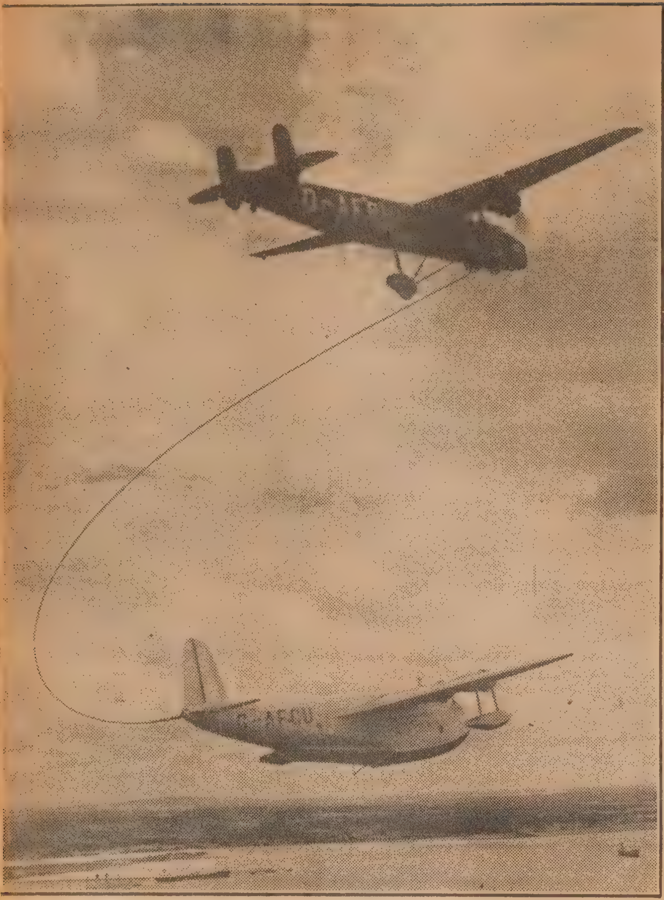
He died suddenly in London shortly after returning from performing at a North London music hall, where he had been appearing. Mr. Goldin was about 65 years of age at the time of his death. He was born in a farmhouse just outside Vilna, in Poland, where his parents tried to make a living from fruitgrowing, but were not very successful.

Magic first came to Goldin when he was about the age of 12. He paid a visit to a travelling show at Vilna. Here he saw a gipsy doing conjuring tricks—rabbits, flags, streamers, cards, and eggs. Thus, he was bitten by the magic "bug" early in life. Later on, he went to America, where he became an American citizen. For many years he was a commercial traveller, when he occupied his spare time by studying sleight-of-hand, tricks, and kindred arts. For two-thirds of his life, Horace Goldin has travelled round the world, entertaining king and commoner with his uncanny illusions.

His most spectacular illusion was the sawing of a woman into four parts with a circular saw. This illusion, he said, came to him in a dream while at a theatre in Berlin. It took him thirteen years to perfect the apparatus for this single trick.

Several times he was commanded to appear before royalty and the crowned heads of Europe, and one of his treasures, which he wore every day, was a tie-pin which King Edward VII. and Queen Alexandra gave him after a performance at Sandringham. The Kaiser was at this particular performance, too, and actually assisted Goldin with a handkerchief trick.

PLANES



The flying boat Cabot is seen here re-fuelling in mid-air over Southampton Water.

Aviation is now old enough to have its own specialised problems. One of these concerns the refuelling of planes, particularly large types, with which the weight of fuel represents a big proportion of the total load.

THE use of large airliners and flying-boats for long distance work is an obvious development for the future. Already much freight is carried by r, and, as time goes on, the tonnage er year must increase very consider- ly.

Planes themselves are bound to be- ome even larger for such work, and nis will mean bigger and weightier fuel ads which must be carried in addition the cargo.

Not only will the size of the loads crease, but also the distances over hich they will be carried. Here again, g loads of fuel are almost unavoid- le if the planes are to have a large uising range, not forgetting a good fety margin.

The total weight which a freight plane can carry in the air is quite a different thing from the weight which will permit an easy take-off. You will remember that this difference necessitated some of the early long-distance flights being started from ocean beaches where a long, straight run was possible. The ordinary aerodromes were not large enough to make up for the higher speed and longer runs required to get a big plane off the ground, when loaded to the maximum with fuel.

This same difficulty is, of course, present to an even greater degree with flying-boats. The tendency must be always to take full advantage of the weight any plane can carry consistent with a safe take-off.

This is one reason why experiments are now being made to evolve a technique to allow satisfactory fuelling of a plane while in the air. It is safe to say a larger fuel load could be taken, if the limitation imposed by the take-off were removed.

Even if portion of the fuel were to be taken on board before the plane leaves the ground, and the full load completed in the air, the pilot would have many less anxious moments.

It will be realised the complete refuelling of a large plane is a somewhat lengthy business, and a complete load of fuel to be transferred while in the air might counterbalance the advantages.

USED TO BREAK RECORDS

The idea of refuelling in the air isn't particularly new. It has been done several times in the case of planes attempting records for long-duration flights. By means of refuelling from another plane, the record-breaker has been able to keep aloft much longer than would have been possible on a single load of fuel.

At the present time, experiments are being carried out in England to determine a safe and practicable method of refuelling from the air.

Our pictures show a large flying-boat being used in flights over Southampton Water.

The fuelling plane is a converted bomber, fitted with special fuel tanks to supply the flying-boat.

In the first of these pictures, the hose connection is seen run off the reel, and in contact with the flying-boat at the tail.

The hose is picked up by means of a guide rope, which is first brought through the tail of the flying-boat. Then the hose is unwound as the guide-rope is hauled in, until, finally, the hose is fully extended, and made fast to the tail.

From then on, it is merely a matter of skilful pilotage while the transfer of fuel is made.

At the conclusion of the operation, the planes exchange signals, the hose-pipe is let go, and hauled back into the ex-bomber.

Despite the simplicity of the idea, reports of the experiments indicate it to be entirely satisfactory. It is anticipated that by the use of special planes for this work, the efficiency of long-distance transports will be considerably increased. Naturally at the conclusion of a flight, the transport plane will have consumed most of its fuel load, and only the actual weight of the freight need be taken into account when assessing such things as landing speeds and landing space.

These pictures were taken during a

REFUELLING IN FULL FLIGHT

demonstration to show how flying-boats for transatlantic service are refuelled in midair. The operation takes fifteen minutes, during which the two planes travel together for about 40 miles.

REFUELLING FROM CAR

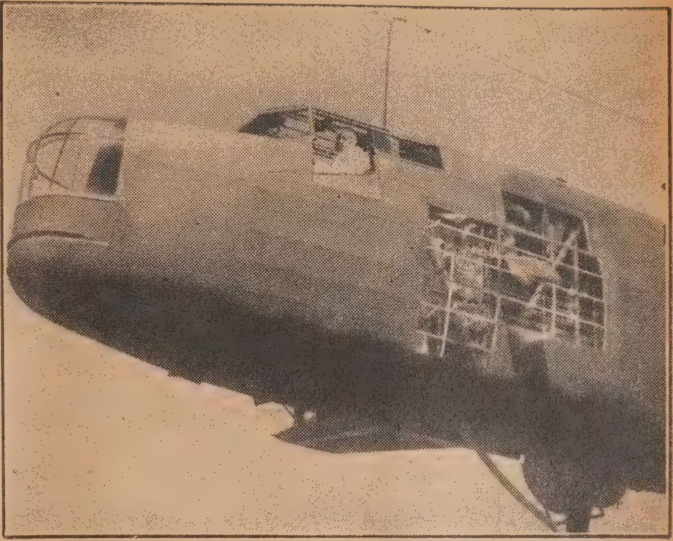
Another method of refuelling a plane, while in flight, makes use of a fast motor car.

Such a system would, of course, be useless where such a large plane is concerned, as, for instance, the one pictured here. But in the early days of endurance flights, motor cars were used quite frequently.

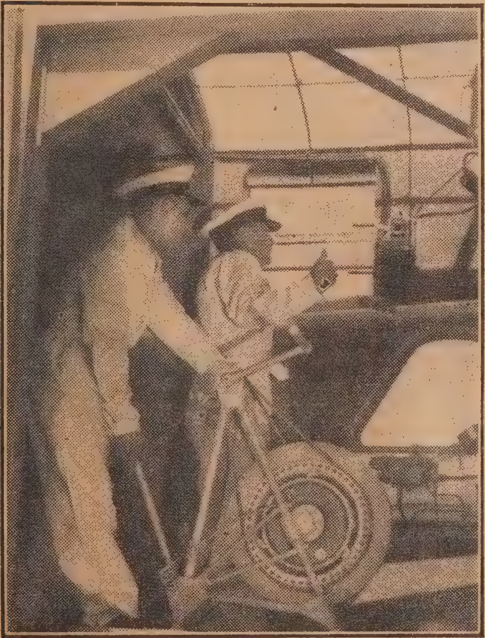
The technique in general is the same as that used when refuelling from another plane. The car contains a fuel tank, and a pumping mechanism. The plane calls for a very skilful pilot, who can keep his machine within the limits in height demanded by this method.

A hose pipe is lowered from the plane and connected to the mechanism in the car. Fuel is pumped up the hose into the plane's tanks. Obviously, small planes capable of flying about 60 or 70 miles an hour were used in such endurance flights, and localities selected where a car could indulge in long speed runs without interference.

This stunt—for it is only a stunt—attracted much attention when it was first successfully completed, and many readers will remember pictures and news-reels appearing, with feature shots of the daring record-breakers.



Giving the signal from tanker to flying boat to commence operations.



The tanker plane takes up position, and the crew of the tanker carries out the principal operation—that of connecting the hose to the flying boat. A load of 5000lb of fuel is transferred from one to the other. This picture shows the first officer and wireless operator of the flying boat hauling down the hose with a specially installed winch.

LEICHHARDT ON TOP AGAIN AT M.A.A. CONTESTS

At the September contests held on Sunday, September 24, at Dumbleton, the Leichhardt team won the inter-club shield with an aggregate time of 52min.

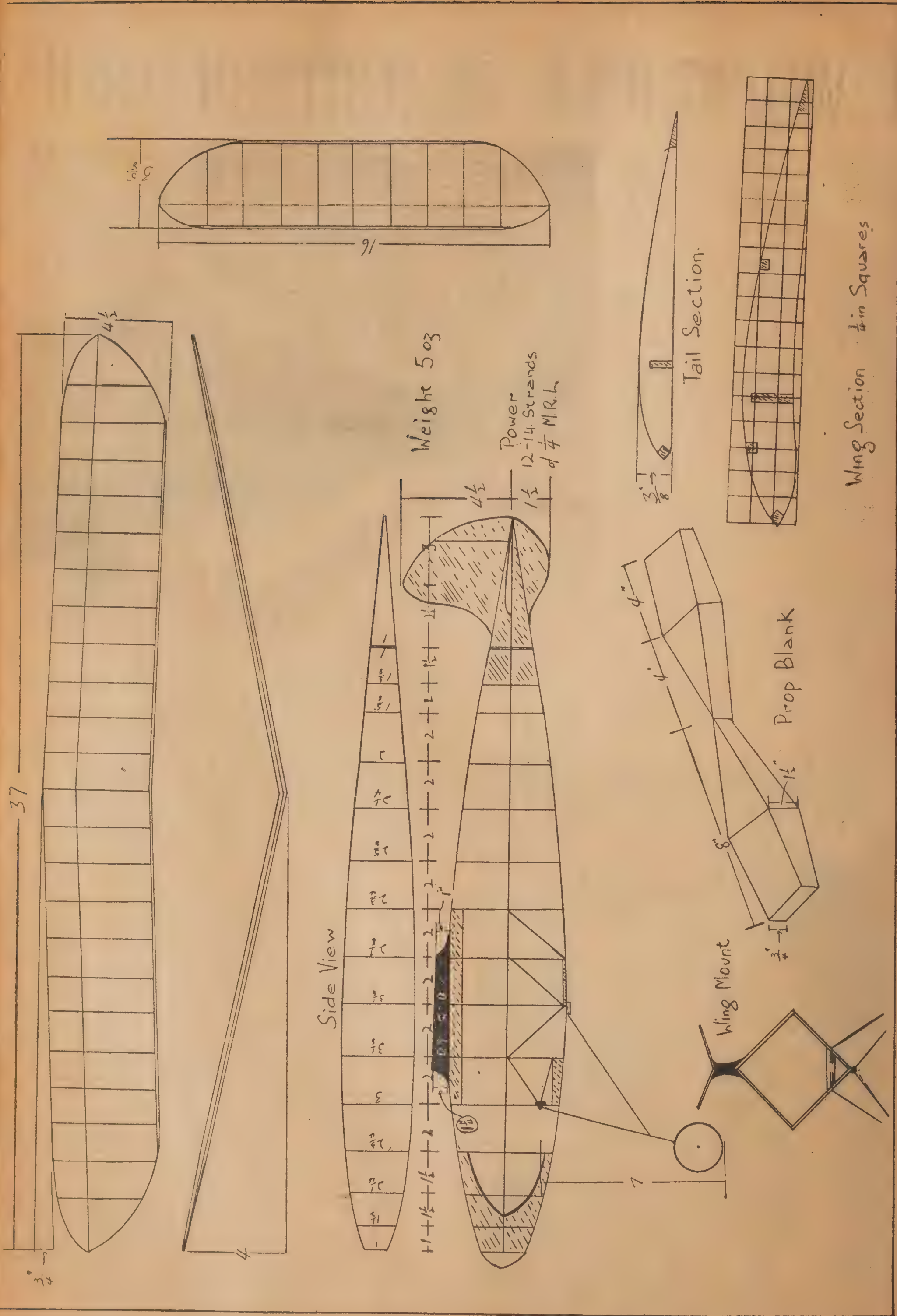
This makes their second win in succession, and now leaves them in secon position, with the Aerobats only on contest in front of them.

In the open contest Arthur Butler, o Leichhardt, was first with 15min.

Leichhardt certainly had a day out winning the shield and securing firs and second places in the open contes

The conditions were excellent, an many excellent flights were recorde One flight was particularly noteworth That was a flight of 4min. 36sec. with hand launched glider by Jim Barnet of the Hornets. Jim is one of the bes glider flyers in the M.A.A., and his performance on Sunday (he had severa flights of 1½min.), indicates that he wil be well to the front in the glide championship. We wouldn't be at al surprised to see Jim carry off the title

The glider championship has certainly given an impetus to this branch o the sport. Jim Fullarton broke th minute on several occasions, and Malcolm MacGregor gave an excellent display of throwing ability.


16
3 3/8
37
4 1/2
3/4
4
Side View
Weight 5 oz
Power
12-14 Strands
of 1/4 M.R.L.
4 1/2
1 1/2
7
Tail Section
3/8
Wing Section 1/4 in Squares
Prop Blank
4"
8"
1 1/2"
3/4"
Wing Mount

A WEIGHT-RULE COMPETITION MODEL

The type of model which best suited these conditions was the diamond fuselage. The drag on this fuselage is much less than that on the conventional square or cabin type. At the same time, it permits reasonably light construction and thereby allows the use of plenty of power without exceeding the weight limit.

The finished model weighed 5oz. This actually was almost ½oz. heavier than was required, but it still gave a power to weight ratio of just under 50 per cent.

The parasol wing used in conjunction with a lifting tail makes for stability and excellent climbing. Incidence adjustments need to be made carefully, however, since all lifting tail models are sensitive to these adjustments.

The actual construction of this model follows conventional lines and should present no difficulty to any model-builder who has successfully built and flown a model. It is essentially a contest model and not particularly suited to the absolute Tyro.

FUSELAGE

Before commencing construction, draw up the plans full size.

The fuselage is built up perfectly square and the wing is mounted on one edge. Do not make the mistake of drawing up the projected side view of the machine. It is hardly likely, but it has been done. The side view is marked clearly on the plan so as to avoid confusion.

Cut several strips of 3-32 square balsa and then build the two sides. Build them one on top of the other on the plan. Cement the struts to the longerons with acetone cement.

This model has a detachable tail boom. The boom is, however, built as a part of the fuselage and separated later. You will notice the two struts cemented side by side about 6in. from the tail; this marks the position of the boom; the longerons are later cut apart here.

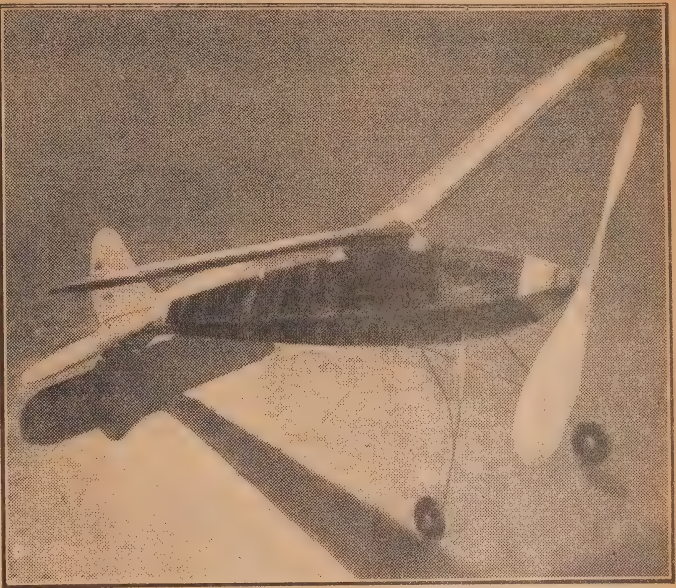
Allow the sides plenty of time to dry and then lift them from the plan. Where the cement has run the sides will be stuck together. They should be carefully prised or cut apart at these points with a sharp razor blade.

JOINING THE SIDES

The two sides now have to be joined with struts and the fuselage frame work completed. Cut sets of struts the requisite size. The top view, of course, is the same as the side, so that the side, top, and bottom struts are all the same size.

Cement the struts into position. Commence with the widest part of fuselage and work towards the tail. Check the framework constantly and make sure it is perfectly true. At this stage of the construction it is necessary to proceed slowly and carefully, avoiding warps.

Allow the framework time to dry and then cement the strengthening strips.



A photograph of the finished plane—note the large propeller, the dimensions of which have been selected to give maximum duration.

In all branches of model flying streamlining and reduction of drag are two major considerations.

Particularly does this apply to weight-rule flying. Accordingly, in designing this weight-rule machine the idea of obtaining the best possible streamline was considered side by side with the necessity of obtaining a satisfactory power to weight ratio.

Sheet balsa, 1-32in. thick, is cemented around the nose and on either side of the boom.

Strips 1-16 thick and ½in. wide are cemented into position on the top edge of the fuselage where the wing mount is to sit.

A strip of hard 1-16 is cut and cemented across the two struts where the undercarriage is to be fitted and pieces of 1-16 aluminium tubing are cemented into position to receive the undercarriage struts.

By

JOHN CAVILL

Several strengthening pieces should be cemented around these struts and under the wing mount.

When the framework is complete, the whole is lightly sanded and the tail boom separated. A large piece of laminated balsa is fitted with the tail hook, then cut to shape, and cemented to the boom. Make sure this piece is thoroughly anchored, and then cover the boom with light 1-32 sheet balsa.

The fin is cut to shape from 3-3 medium balsa and sanded. Cut and hinge the rudder tab and then cover the outline with a bamboo strip. Do not dope the fin or it will warp, and fair small strips of balsa into position to strengthen the joint between the boom and the fin.

That completes the fuselage.

THE WING

The wing construction is quite simple First make a template of the rib and cut the required number of ribs from 1-32 sheet. Pin several of these ribs t the plan of the wing and then plac the middle spar and trailing edge int position. Cement the remaining ribs in to position and then fit the leadin edge.

The tips are bent from a strip o bamboo 1-32in. thick and 1-8 wide Bend the strip to the right shape, usin heat to soften the bamboo, and then cu the strip down the centre, so that yo have two strips 1-16in wide. Cemen these into position.

The centre rib is made from 3-32 bals and cemented into position after th

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dihedral has been formed.

When the wing has thoroughly dried, crack the leading and trailing edge and raise one wing tip 6in.

Incidentally, the mainspar should be cut at the centre and biased so that raising one wing tip will not warp the framework.

The centre section of the wing is covered top and bottom with 1-32 sheet balsa. That completes the wing framework.

THE TAIL

The tail is made similarly to the wing, except that due to the Clark Y wing section, the main spar can be pinned to the table and the ribs cemented into position.

COVERING

The fuselage wing and tail are covered with silk tissue. Use starch or cornflour paste for simplicity and attach the tissue to each strut or rib. Quick-drying photographic paste may be used if preferred, but the slower pastes allow more time to remove wrinkles and make the covering easier.

WING MOUNT

After the fuselage has been covered, the wing mount is shaped from ½in. balsa and cemented into position. The joint should be given several coats of cement and the top should be supported with a piece of 1-16 sheet balsa, about 2in. wide.

UNDERCARRIAGE

The undercarriage is bent from 18-gauge steel wire. The two black struts meet at the bottom longeron and slot into a piece of sheet aluminium.

PROPELLER

The propeller is carved from a block of medium balsa, 16in. x 2in. x 1½. Cut the blank to the shape shown in the plan and then carve. The prop shaft is made from 16-gauge steel wire and a ball-bearing washer should be fitted between the prop and nose block.

POWER AND FLYING

The power is 12 strands of ¼ flat M.R.L. rubber. Test the model for the glide first. Adjust by varying wing or tail incidence. When the correct elevator setting is found, cement it into position. On the original model the elevator was set at zero and the wing given about 4 degree positive.

When correct gliding position has been found, try a few low powered flights and adjust with down thrust.

When you are satisfied, give the model full power and watch it zoom away in a steep, powerful climb.

MATERIALS

1 sheet balsa, 1-32 x 3 x 36.
1 sheet balsa, 1-16 x 3 x 36.
2 sheet balsa, 1-32 x 3 x 36.
1 block, 7in. x 2in. x ½in.
1 block, 16in. x 2in. x 1½in.
Wire, bamboo, tissue, cement, rubber, &c.

INTERCLUB CONTEST AT DUMBLETON

The winning Leichhardt team which set a record of 25min. in the Shield contest. Back row: A. Butler, R. Stevenson, F. Jones. Front: A. Tanner, L. Butler.

R. Cornish (Chatswood), F. Jones (Leichhardt), and J. Brown (Chester Hill), compare notes. The model belongs to Fred Jones and is one of the reasons why Leichhardt stays on top in the Interclub

☆ ☆

On Sunday 24th September, the M.A.A. held the 5th round of the Interclub shield at Dumbleton. Leichhardt won the shield and also secured first and second place in the open cup. Arthur Butler, and Alan Tanner being the successful fliers.

Below: Les Annesley (Aerobats) gets his model away to a flying start in the open contest. Les is the general secretary of the M.A.A.

Eric Askenbeck with his "Giant" Wakefield model. Just about the neatest model on the field, it turned in consistent stable flights.

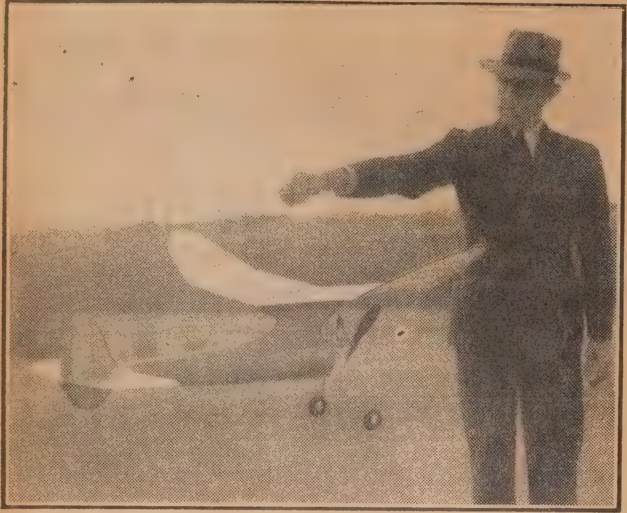
SUCCESS WITH PETROL-DRIVEN

☆

By

A. G. HULL

☆



This photograph of a "Zipper," which has been built for the National Championships shows how a screw-eye can be fitted to allow a ready check of balance in the field.

THERE still seems to be a lot more wrecking of petrol-driven models than necessary. When you have got a good petrol-driven model ying as it should, there seems to be othing easier than to have it taking ff nicely for flight after flight withut any damage done.

But if things don't run right it is ragic to see the wreckage which reults from a nose-dive following a stall, or example. Usually the damage looks orse than it really is, and even the orst of wrecks can be rebuilt at the ost of a few shillings, with a week's pare time of work.

Once in a while the crash is quite navoidable, and it is only to be exected that models will be damaged hen they fly so well that they go beyond e flying-field and land among teleraph posts, or, more to the point, when hey land into them!

A large number of wrecks, however, ould have been avoided if the model ad been thoroughly checked before eing launched.

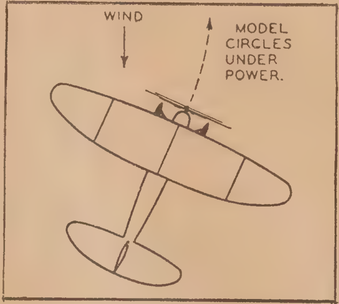
GLIDING TESTS

American writers describe many ethods for testing models before flyng them, usually recommending glidng the model without engine power.

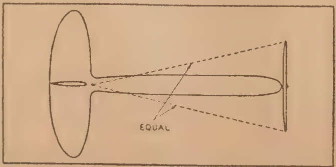
Others have even recommended tying string to the tail of the model and unning along with it until you are sure hat it is going to fly properly and then itting it go.

I have tried this method, but I canot recommend it for the latest types of igh speed models, or perhaps I am getting too old! Personally, I find, too, that the gliding is not always a guarantee that the model will perform properly when going full power.

For example, one of the worst crashes which occurred to a model of mine resulted from a vertical climb turning into a complete loop, the wing breaking in half with the model flattening out on the bottom of the loop. That particular model glided to perfection without the motor power.



Correct launching should be with the wind under the wing which takes the effect of the torque. Alternative methods are also suggested.



Thrust line for the propeller should be straight ahead, and this can be checked by the above method.

SCIENTIFIC MEASUREMENTS

I find that actual measurement is the best indication, and before taking out a model to fly it, I like to put it up on the bench and measure its angles with a ruler, and check its balance by means of lifting it from a screw-eye placed one-third of the way back from the leading edge of the wing.

The little screw-eye seems to have escaped the notice of overseas writers, or at any rate I have not seen it mentioned elsewhere, but I do find it a very handy device, as at any time on the field a model can be picked up by the screw-eye, and if it hangs in normal flying trim it is safe to assume that it is balanced properly.

It will be understood, of course, that the position of the screw-eye is given for the normal type of petrol-driven model, which is fitted with a non-lifting stabiliser. Models using the lifting stabiliser, such as the "Comet Zipper," require the balance point to be one-half of the chord of the wing.

ON THE BENCH

On the bench the model is propped up with a block of wood under the fuselage so that a ruler held vertically at the stabiliser will indicate that both leading and trailing edges are exactly the same height above the surface of the bench; in other words, the stabiliser is quite horizontal and flat. This can be assumed as being the normal flying position of the model. With the model sitting firmly in this position, take the ruler to the main wing and measure from leading and trailing edges of the wing to the bench, not only at the fuselage, but also at several points out towards the wing-tips.

These measurements should give a

ready indication of the angle of incidence of the plane. Normally this should be approximately two degrees, which amounts to one-eighth of an inch in every four inches of chord. If the chord is eight inches the leading edge, measured at its centre, should be one-quarter of an inch higher than the centre of the trailing edge. Any warp in the wing will be revealed by the measurements out towards the tips. If everything is in order the incidence will be retained throughout the entire span of the wings.

DOWN THRUST

The next point to check is the downthrust of the propeller-shaft. Setting the propeller vertically, a straight edge will soon show whether the propeller-shaft is facing upwards or downwards.

Normally it should face downwards, but only at a very small angle, something like half or one degree. While the model is on the bench it should be looked over carefully in order to see that everything is straight.

Standing in front and looking straight on to the propeller-shaft, it should be possible to see any warps in the stabiliser or rudder

When these angles are right and the model properly balanced, there should be little trouble about it taking off and flying perfectly, to glide in without any harm after the motor is "cut."

EFFECT OF WIND

Strong wind is a great handicap to the flying of petrol-driven models, and if at all possible a model should be tested on a calm day, before an attempt is made to fly it in a wind. General practice seems to be to launch the model directly into a wind, but again I have found that this has not been a good plan according to my limited experience.

Another recommended practice is to launch the model with the wind going in slightly on the left side, so that the torque of the propeller tends to turn the model into the wind. My experience has been that in these circumstances the model will turn into the wind to battle with it, flying more or less straight away, and not giving a very satisfactory performance.

In one or two cases I have known this to result in the model facing into the wind and climbing up vertically, to eventually stall and nose-dive, with the wind holding the nose down until the crash occurs.

My most successful method of launching appears to greatly upset accepted theories, but it has worked out well in practice. It is to launch the model so that the wind is coming in from the right-hand side. Launched in this way, the model takes off and immediately banks over and turns away with the wind, attaining great speed, but climbing all the while.

After it attains a high rate of speed it turns around into the wind and climbs steeply, turning again with the wind before it has time to stall. This gives the most effective spiral climb, and certainly seems to suit my own particular models. I could not, however, recommend it for any model which does not have plenty of power and a very quick take-off, as if the wind got under the right-hand wing and tipped the model sideways, almost anything might happen before it has a chance to obtain flying height.

MOTOR RELIABILITY

Another frequent cause of wrecked models is the failure of the motor to keep running consistently while the model is climbing. I find that it is a very bad practice to release the model until it is very evident that the motor is running sweetly, the jet properly adjusted, plenty of fuel in the tank, and every indication that the motor will keep running until the model has climbed to sufficient height to give it a decent chance to flatten out and glide in safely.

Just how to get this degree of reliability from the motors is another problem, and I am afraid books could be written about the subject without covering all the minor points which need attention in order to get reliability.

Air leaks are especially important, the slightest leakage at the gasket of the sparking plug, around the crank gas cover plate, or around the induction pipe near the jet holder will mean erratic running of the kind which should be carefully avoided.

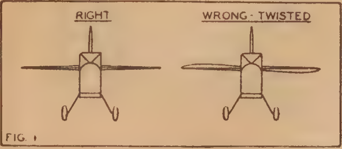


Fig. 1.—Looking at the model head-on should reveal any warping of the surfaces.

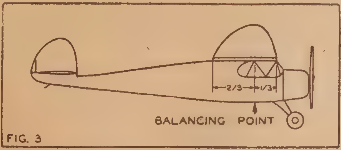


Fig. 2.—A slight amount of wash-in is permissible on the left-hand wing to counteract the torque of the propeller.

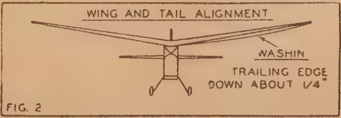


Fig. 3.—Correct balance can be checked by seeing that the centre of gravity is in the right place. As suggested in the article a screw-eye fitted into the wing provides a much handier method.

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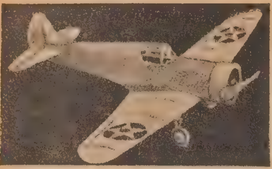

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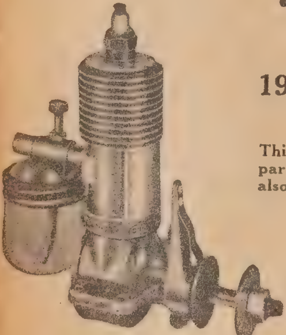

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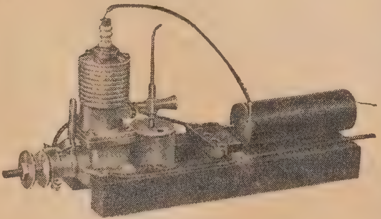

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LATEST KITS FROM U.S.A.

Model plane enthusiasts will be interested to know that samples of the latest American kits arrived during the month. They embody several novel features.

IN Sydney, the latest Megow "Commander" and "Cadet" kits have arrived. Both of these models, the "Commander" for one-fifth horse-power motors and the "Cadet" for one-seventh horse-power motors, are of high-performance type and have rocket climbing ability in order to get maximum altitude in the 20 seconds allowed under the new regulations. The two models are similar in design, with the "Commander" having a six-foot wing spread and the "Cadet" 51 inches. The kits themselves show that the American designers have put in an extraordinary amount of thought to make them suitable for construction by inexperienced builders.

Both kits supply the leading edge made up from a channelled and moulded piece of balsa. This leading edge completely replaces the usual spars of the wing assembly, the whole of the loading being carried by the leading and trailing edges.

This appears to give an extraordinarily strong wing, together with easy assembly. The fuselages are built up from sheet balsa, the normal square longerons being entirely absent in both models. This method of fuselage construction has much to recommend it, being quicker to assemble than the built-up type, and also having a much greater strength in proportion to its weight.

FROM BRISBANE

From Brisbane comes samples of the latest "Comet" kits, which have been landed from America by the Brisbane agent. The "Zipper" kit has already gained international fame by the performance of these models at the 1939 National Championships held in Chicago a couple of months ago. "Zippers" practically sweep the board. The "Zipper" is remarkable in that it is capable of carrying a one-fifth or even a one-quarter horse-power motor, yet has a span of only 54 innches.

Carl Goldberg, the designer responsible for the "Zipper," has taken every step to get maximum climb and still conform with the 20 seconds rule and the wing loading regulation of eight ounces per square foot. The large stabiliser, practically half the size of the wing, is fitted with a lifting aerofoil, and undoubtedly contributes greatly to the performance of the machine, yet does not come into the calculation when considering the wing loading.

Local builders are hard at work assembling models from these kits, and it is going to be very interesting to see how they perform in our own national championships to be held at Dumbleton on November 5.

NOVEMBER NATIONAL CHAMPIONSHIPS

RECORD ENTRIES EXPECTED

National Championships for model aeroplanes, which are being organised by the Model Aeronautical Association for November 5 and 12, are by far the most ambitious competitions for model planes launched for many months. Prizes valued at over £50 are available for distribution and it is already clear that a record number of entries will be received in the various sections of the contest.

PETROL-DRIVEN MODELS

The contest for petrol-driven models will be held at Dumbleton on November 5, and keen competition is expected for the first prize, which consists of the Aeroplane Jellies' Cup and also the Kriesler "Compact" radio receiver.

Modellers are very loud in their appreciation of the generous gesture of the Kriesler (A/sia) Pty., Ltd., in making this valuable contribution towards the development of petrol-driven model planes.

The gift was made by Messrs. Tuit and Weingott, directors of Kriesler, with expression of opinion that the development of aviation in Australia will lie in the hands of the youth of to-day, and they feel that they are rendering a national service in fostering the hobby and sport of model aeroplane flying.

OTHER PRIZES

Second prize for the petrol-driven models is an Eversharp fountain pen and pencil set, valued at £3 3s and donated by the distributors of Texaco motor spirit.

The third prize is electrical goods to the value of £3, donated by Slingsby and Coles.

The fourth prize is a five-cell focussing searchlight, donated by the Eveready Co.

A large number of special models are being built to compete in the National championship, and entries have been received from near and far. A number of examples of the latest Megow "Commanders" and Comet "Zippers" will be flown, and enthusiasts look forward eagerly to see how these latest American models perform and how they compare with the local designs.

RUBBER MODELS

The championships for rubber-driven models and hand-launched gliders will be held at Maroubra on November 12. For the "Open Class" first prize will be one of the new "R.K. Bee" petrol motors, a scientific "Red Zephyr" kit, and a silver cup.

The "R.K. Bee" motor has been donated by R. Keith Blackwell, well-known radio condenser manufacturer, who has just installed equipment for the manufacture of these motors in Sydney. The "Red Zephyr" kit has been donated by Jack Lowther, manager of the Swift Hobbies and Novelty Shop, of 156 Adelaide-street, Brisbane. Second prize is £1 and third 10s 6d.

"WEIGHT RULE" MODELS

For the "Weight Rule" contest, first prize is a complete kit for a petrol-driven model, consisting of a "Commander" kit and a "Mighty Midget" motor kit, donated by "Radio and Hobbies." The second prize is an open order for £2 2s, and the third prize an open order for 10s 6d.

GLIDERS

For the hand-launched gliders, a stopwatch is first prize, the second prize is an open order for £1 1s, and there are also minor prizes for third and fourth places.

AMPLIFIERS

Another donation to the M.A.A. which is greatly appreciated by the member is from Frank Bridgewater, who wil provide one of his powerful "Amplivox sound systems for use at the contest to keep the public informed of th progress of the competition and assis the officials in their organisation.

HOW TO ENJOY THE NATIONALS

Anyone with the slightest interest in aviation should be able to find endless interest in the National Championships being held by the Model Aeronautical Association on November 5 at Dumbleton and on November 12 at Maroubra. Admission to both carnivals is quite free, and there is not even a charge for car parking.

TO REACH DUMBLETON

Dealing first with the championship for petrol-driven models at Dumbleton, the location of the flying field is about half a mile to the north-east of the Dumbleton railway station, which is about 10 miles from the city on the Tempe-East Hills railway line which runs about half-way between Hurstville and Punchbowl. Trains leave Central at 8.47, 9.25, 10.5 and 10.45 a.m. Going by car from the city the Parramatta-road is followed down Taverner's Hill, across the lights at the bottom of Taverner's and then the Old Canterbury-road is taken to the left about fifty yards ahead, and before the Parramatta-road goes under the railway bridge.

The Old Canterbury-road is followed out past the Canterbury-Bankstown hospital, and half a mile farther on the Canary-road runs off to the left at the foot of a large water tower which is visible from quite a distance. Half a mile down the Canary-road the flying field will be seen on the left.

FROM EASTERN SUBURBS

To go to Dumbleton from the Eastern Suburbs the best plan is to cross the Canal-road bridge at Mascot, follow the Princes Highway to Arncliffe, then turn right along Forest-road, turning right again at Bexley along Stone Creek-road, which cuts Canary-road about two miles from Bexley and jus south of the Dumbleton railway station

THE OBJECT

The aim of the competition is to ge the longest flight from a 20-second motor run. Automatic timing device are fitted to the machines to stop th motor after it has been running fo this period. The models have to tak off from the ground under their own power, climb as high as possible in th time limit and then glide to earth. Th average time for three official flight decides the winner.

Most of the models, of which abou seventy should be seen in action, ar from four to six feet in span, fitted wit little petrol motors of about one-fift horsepower. Some of them are expected to climb at the rate of 2000 fee per minute, which is most spectacular.

SUGGESTIONS

Spectators are welcome, but are requested to be as considerate as possibl Contestants are often hampered b crowds which press around them whe starting models. Cars should be parke to the windward of the taking-o ground, as models tend to turn and fl with the wind.

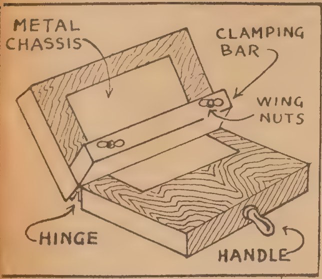
Arrangements to bring refreshmen should be made, as the contest runs fro 10 a.m. till late in the afternoon, an there are no facilities for the purchas of food or meals.

RUBBER MODELS

The championships for rubber mode and gliders will be held at Maroubra o November 12. The flying field is located about half a mile to the south west of Maroubra Junction, readily accessible by tram. By car the Bunneron Road is taken at Kingsford Junction.

Hints For Your Home Workshop

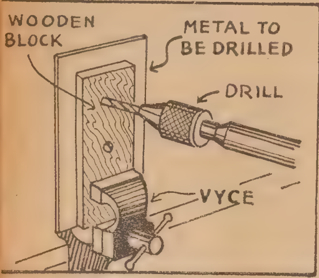
EASY WAYS OF DOING THINGS



HANDY CHASSIS BENDER

Getting clean right angle bends in aluminium when making a chassis presents quite a problem when a metal bender is not available but this simple device shown in the accompanying illustration gets over the trouble nicely. No dimensions are given as these will be governed by the size of the chassis required.

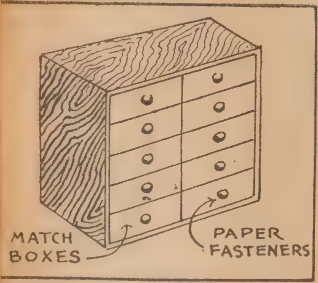
☆



DRILLING CLEAN HOLES IN METAL

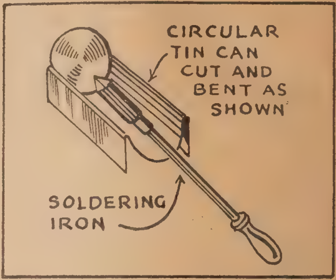
It is usually found that a nasty burr is noticeable where the drill breaks through when drilling thin metal sheets, but all this trouble can be overcome by clamping the metal between two blocks of wood and drilling through the lot thus assuring a perfectly clean and flat hole..

☆



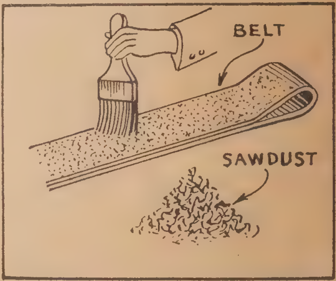
HOLDER FOR SMALL PARTS

Obtain a number of empty match boxes removing the sliding section. Glue the cover sections of the boxes together and when dry build a small wood box to take the whole assemblage. In one end of each of the draw sections fix a paper fastener to act as a handle. The sketch gives the idea of how your little nest of draws should look when completed.



SOLDERING IRON HOLDER

Don't burn lumps out of your bench when with a round tin can and about 10 minutes of your time you can knock up a handy little holder as illustrated. It is simplicity itself and requires no description as the details can clearly be seen in the sketch.



CLEANING OILY MACHINE BELTS

Leather belts which have accumulated oil and grease can be returned to their original condition by rubbing with fine sawdust. Scrub the sawdust over the belt using a stiff bristle brush. When this work has been completed, scrape off the sawdust with a putty knife. For the final operation coat the belt with Fuller's earth and set aside to dry in a warm place. The Fuller's earth removes the remaining grease particles from the pores of the leather.

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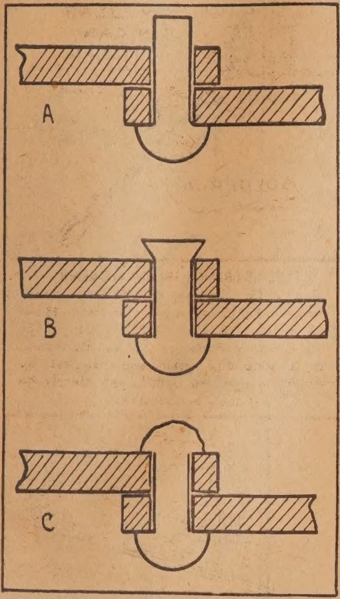
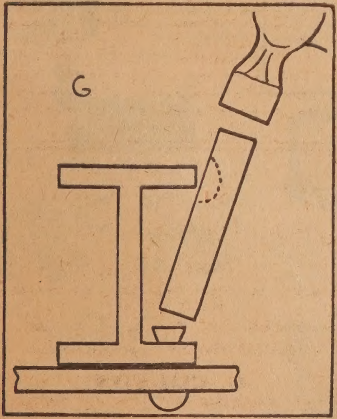
SIMPLE HINTS ON RIVETTING



A: The rivet should be a light drive-in fit in the holes and the projecting length should equal two rivet diameters.

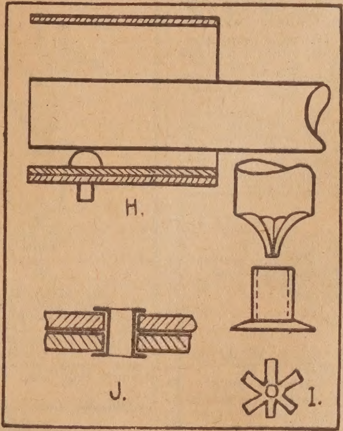
B: Use light and quick hammer blows rather than slow heavy ones. After the first few taps the rivet looks like this.

C: Use the ball peine hammer and round off to complete the job. Never leave the head flat as a weak joint will result.



G: A flat punch or rivet-set helps with awkward jobs where the rivet cannot be hammered direct. A refinement would be to grind away the side of the punch where it fouls the job and thus allow of vertical hammering.

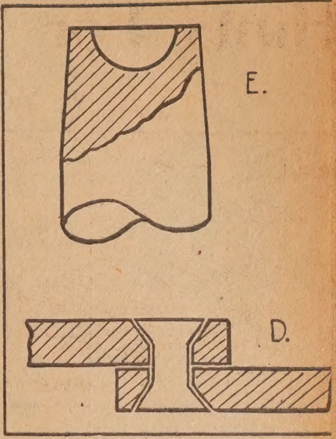
Many joints in metal are made by the use of nuts and bolts. The use of rivets has a good deal to commend it, and there are dozens of jobs in the workshop which are much more suited to rivetting than to bolting. Here Mr. A. J. Barnes has given a diagrammatical story of how rivets should be used. As with so many things, it's easy when you know how!



H: How to rivet cylindrical work. The head of the rivet rests on a steel bar or heavy pipe which is clamped in the vyce. Flat-head or "tinman's" rivets are best for large areas of thin sheet metal.

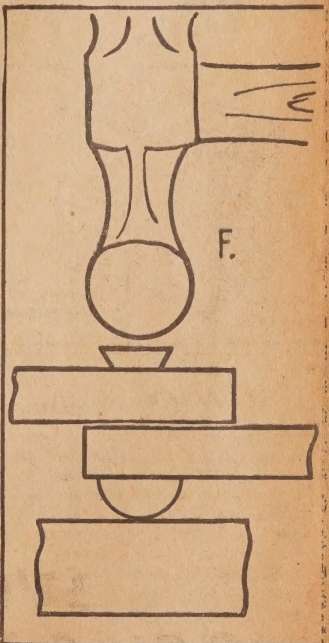
I: Automobile supply houses stock tubular brass rivets and rose punches for clutch and brake servicing. This system of riveting can be applied with advantage to many other kinds of work such as fitting valve sockets to chassis and shield boxes, &c.

J: Short pieces of copper or brass tubing may be used for riveting light work. First open out with a centre-punch and then flatten with a hammer. Many radio components are riveted in a similar manner. Brass escutcheon pins also make excellent rivets for delicate work.



D: A riveted job with countersunk rivets. The angle of countersink should be 45 degrees and the diameter twice that of the rivet. Rivets can be made up from short lengths of round rod.

E: Showing business end of a rivet setting tool which makes for neat work. It consists of a piece of tough steel shafting with a cup-shaped recess in one end. This recess may be turned out in a lathe or may be formed by heating the end of the steel and driving it on to a steel ball.



F: The rivet head should rest on an anvil or rivet-set held in a vyce. An emergency anvil may be set up by clamping an old flat-iron upside down in a vyce.

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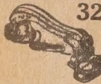

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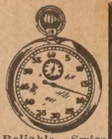

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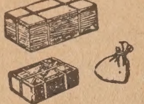

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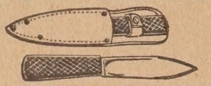

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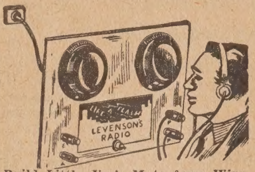

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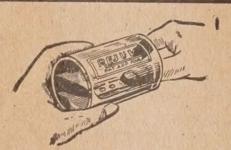

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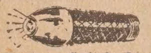

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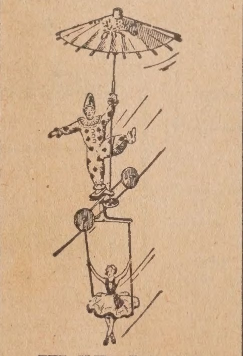

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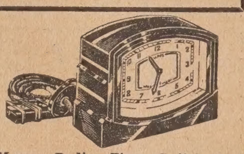

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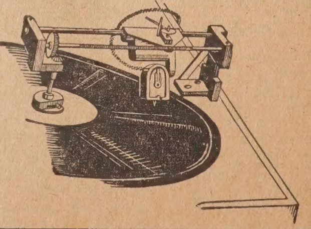

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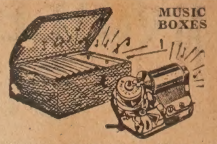

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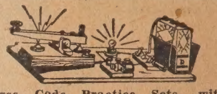

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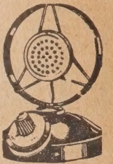

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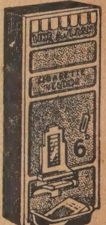

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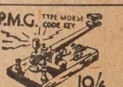

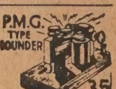

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ANSWERS TO CORRESPONDENTS

S.H.C. (Carnegie): The need for a few more reaction turns may be due to odd conditions in your set, and one always anticipates the possibility of a slight change one way or another. Model Railways is a difficult hobby to cover, and one we do not think is as universal as many others. It is hard also to get everything in the paper inside the limits of our pages. However, if enough readers are keen to see Model Railways featured, we will see what we can do about it. It's up to you, fellows! A speaker could be used with this set, but make it a permagnetic and have done with it. There wouldn't be enough excitation to give decent results, as you suggest. There is no possibility of programmes being published in RADIO AND HOBBIES. You should be able to get your copy of the paper within a few days of the publication date, which varies a little from month to month, according to how the days of the week fall.

M.A. (Broken Hill): Your questions we have anticipated by publishing an article in this issue, concerning the use of test equipment recently described in our pages. Special attention is given to the oscillators for lining up receivers. No doubt this article will tell you all you want to know about their connection to the set, etc.

R.A.C. (Wentworth): Thanks for your letter and its suggestions. We doubt whether it would help very much to do as you say, as the W.I.A. is still going strong, and the Amateur magazine, the official organ, is still carrying on. However, there is something in what you say, and we will certainly do all we can to keep something good for amateurs, within the limits imposed on their activities.

T.J.G. (Inglewood): It is almost impossible to tell the full life of the batteries you mention, without knowledge of the drain, and also the working conditions. We suggest that you write to Everready and ask them. Perhaps they have some figures which they can give you. We published some vibrator sets in "Wireless Weekly" about twelve months ago, and have some plans for further sets some time soon. Thank you for your wishes for continued success.

R.N.K. (Prospect): Glad you think our paper "outstanding for two reasons—its low price, and the enormous amount of valuable information." It would be difficult now to publish the list of commercial stations, and such a list would be very hard to compile accurately. Unless it was accurate and complete it would be of little value. However, we are passing your letter to our short-wave correspondent, who may be able to help you.

B.A. (Eastwood): We suggest that you start with 45 turns of wire on the three-inch former for both condensers. You can add or subtract a few turns as required to get the full coverage. We suggest the use of a 50,000 ohms resistor in the plate circuit of the 19. The 26 gauge wire should be quite all right for the coils.

H.T.W. (Agana): Glad you liked the Portable set. The Economy Six should have a much greater range, because of its higher gain. On short waves it should be able to give you all the main overseas stations at good volume. Any good permagnetic speaker would be suitable—the best types giving best tone and volume.

R.P. (Brisbane): We suggest you write direct to Radiokes on this matter. They will be able best to advise you. Their advertisement appears in this issue.

M.C.G. (Malvern): Thanks for your letter and its suggestion. We will keep in mind when printing something about little sets.

R.K. (Murrayville): We have an article in preparation dealing with small set circuits submitted by our readers, and possibly when it appears, you may find one which is something like what you have in mind. Thanks for your suggestion. However, light plugs are so cheap, and the use of anything but approved designs so risky, that we really prefer to see a properly manufactured article used at all times.

N. McK. (Maroubra): The 30-valve is designed to work with two volts, although it will often operate quite well with 1.5 volts. We suggest first of all that you return the grid leak to the positive side of the filament—this will probably fix matters. Evidently with the rheostat just on, the valve is getting more than 1.5 volts. As a detector, often anything over about 22½ volts will not work as well as will this lower voltage, although when you change over the grid leak, you may find the position very different. Anyhow, give it a trial.

"Fitz" (Moree): It is hard to say what is wrong with your set, unless the lining up is at fault. There is no reason why it should not track properly over the dial. All we can suggest is that the condenser is faulty or the coils are not matched. There is nothing else in your letter to give us a lead.

"Doubtful" (Marrickville): There is no need to switch off the B battery in Little Jim, as there is no drain on it when the filament is not alight. Yes, phones of 4000 ohms would be quite suitable. Your diagram of the connections seem to be correct. The switch should not break the minus lead of the B battery—only the A battery. In other words, it is placed in the lead from the A battery minus, and the chassis. The B battery minus is connected direct to the chassis. Thank you for your good wishes.

N.G.B. (Casterton): An article on boat building is not a bad idea, but we fear that only a few would be interested in it. Also to do it properly, quite a fair amount of space would be required. However, if enough readers write asking us for such details, and particularly if they have any suggestions regarding the same, we will try to see whether we can have it covered in a future issue. But, really, it might be a bit above our weight as a magazine.

R.S. (Nth. Williamstown): Thanks for your nice remarks about the paper. No, we have no other details about the 4/39, but those we gave should enable anyone to make a good job of it. If you cannot follow these diagrams, we strongly suggest that you study radio a bit more until you can make them out. The layout given for the set is quite suitable for inclusion in a portable cabinet. As a matter of fact, if you put a handle on the case of the 4/39 as it stands, and as some readers have done, you couldn't wish for anything better in the way of a "portable" A.C. receiver. We doubt whether you could get the set into a smaller compass. Best wishes for your 4/39, and sorry we haven't any further information available on it.

Readers are invited to send questions on Radio or Hobbies, for reply through these columns. Don't make your question too long, or too complicated. Remember space is limited, and we can't explain "What is Radio?" in two inches of type. Replies will appear in the first available issue. Interesting subjects, too involved to be handled here, will be accepted as suggestions for articles elsewhere in the paper.

H.L.M. (Tweed River): Sorry you didn't like the battery short-wave set. It is probably a much better one than you think it is, and you evidently don't know what such a job can do to condemn it so drastically. A very large battery short-wave set, in our opinion, would not interest a large number of readers, and a receiver covering from 9-110 metres isn't as simple as you might think it is—not if we regard first-class results as a necessity. However, if enough readers ask us for a seven or eight-valve set of this nature, we will certainly give it some thought. Thanks for your other appreciative remarks.

K.H. (East Orange): Suggest that you get into touch with one of our advertisers about the cost of the various components you mention. They vary somewhat, and this appears to be the only logical way out. As you are so close to the wires, we doubt whether you can do much about it, other than running your aerial at right angles, and as far from the wires as you can. Why not contact the local electricity people about it?

D.J.B. (Hampton): The receiver was called "Little Jim," and not "Little Joe." Any of our advertisers can supply you with parts for this set, as it is a very popular design, and well known everywhere.

R.C. (Watchupga) wants instructions for building a glory box.

A.: A description of a glory box is not set down in our schedule of articles on simple carpentry at present, but we will see what can be done about it. Glad to know that you appreciate our magazine.

B.W.S. (Ashfield) wants us to run an article on a car radio set.

A.: Yes, it is our intention to give details of an effective car set in the near future, within a couple of months at the outside. At the moment we haven't decided on the number of valves to be used, but, taking into consideration the limited signal pick-up of the type of aerial possible with an all-steel car body, we feel inclined to think that at least five valves are desirable to get sufficient sensitivity.

N.T.H. (Parnell, N.Z.) wants a circuit for a portable set, using 1.4-volt valves.

A.: A circuit of the kind you require was given in our issue for June. This circuit has proved very reliable and satisfactory in every way. The size of the base given in the parts list was half an inch out, but you can make sure on this point by taking dimensions from the diagrams.

Tapper (Korumburra, Vic.) wants details of how to build a microphone, also how to measure the capacity of home-made condensers.

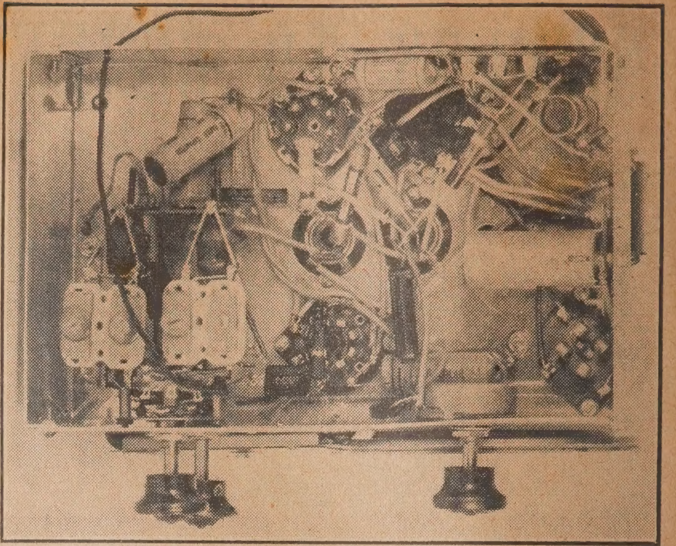
A.: Details for the construction of a cheap microphone were given in our issue for September. Trouble about calculating capacities is to measure the spacing between plates. Quickest way is to put the condenser across a coil and find what frequency is tuned by the resultant circuit.

W.O.T. (Young) wants to know whether we can supply a circuit for a 2-valver capable of giving good reception in country.

A.: We regret that our reply-by-mail service was completely suspended several months ago and we are quite unable to supply circuits to order, even if a postal note for a shilling is enclosed. It is very doubtful whether converting your one-valver to a two-valver will solve your problem, as selectivity may still be a difficulty.

M.J.G. writes: "For some time I have owed you a note of appreciation in connection with that very excellent idea which you call stereoscopic reproduction. For some weeks now I have had two speakers on my "Master 6," the high note speaker input being filtered by a 25 mfd. condenser, and the low note being set up in an ordinary cabinet with a movable baffle more or less on the lines of the horn described in 'Wireless Weekly' last year, placed in front of the usual cabinet. The net results are, to say the least, most fascinating, and with one speaker in each corner of the room the illusion of an actual orchestra is astonishing. Particularly when using the gramo. pick-up is this the case, and with the realism of modern records and a speaker system like the above there appears to be no need for any volume expansion to achieve what is an exceptionally satisfactory degree of realism. There is also a lighter side to the matter. Two owners of 1938 5-valve radio sets, after hearing the Master 6 and stereoscopic hook-up in action, requested me to look over their radio sets, as they were not performing too well. Investigation could not reveal anything the matter with their radios, and their trouble appears to be that they were properly amazed at what they heard from the Master 6 and stereo, and that their own radios have, as a result, appeared a bit flat. When arranging the stereoscopic setup I rather pessimistically, perhaps, included a switch in the connection to the voice coil, but I can assure you that that switch is never turned off; if it should accidentally be off there is a very uncomfortable feeling about, as though something important is missing. Both speakers are 8in. P.M., one 'Rola' and one 'Amplion,' just what I happened to have on hand. The remarkable thing about this business is that one is getting such a lot more beauty in muic at no more cost, as the current drain of the set is the same with one or two speakers, and also the total volume is unchanged. In conclusion, I cannot say too much for the Master 6, as it is absolutely outstanding in performance, both on broadcasting and short wave bands, and for gramo. work, and so once again to 'W.W.' and the Tech. Ed., thanks for a fine receiver, and as for stereoscopic reproduction, believe you me it has come to stay in this home."

ANSWERS



Several readers have asked us for a picture showing the under-chassis wiring of the 4/39. So we have had it photographed, and here it is. Maybe it will help some who have been a bit worried over one or two constructional points.

"Learner" (Brisbane): The hum could well be caused by failure to shield the imput circuit. It may be induction hum as you suggest. Apart from this, the set should not suffer from high hum level. The change to 2.5 volt valves would not affect this point. It would be better to contact the makers of the meter, or their agents, when special resistors are concerned.

N.L.R. (Lithgow): At the moment, we have no back numbers of these issues available. If you care to send us 6d in stamps for each issue, in the hope that some may have been returned in the interval, we will be pleased to let you have once. If the issues are still unavailable, we will send your money back to you. More than this we cannot do.

C.L. (Kalla West): Glad you got such good results with Little Jim's Mate. It has been a very popular set. The model aeroplanes as described to date cost very little to make —about 5/- should easily cover you for the parts. Probably much less than this. Believe us, model planes are lots of fun when you get going!

D.A.B. (Newtown): It is very hard to advise a book on radio, because one never knows just how much is already known. We suggest that you visit one of the big booksellers in the city, and ask for some of the books by Rider. You can then select the one which seems to be what you want. We still have a few of the original Wireless Weekly Handbooks available at the office. This handbook covered much of the elementary principles of radio, and contained other useful information. We will post you one on receipt of 1/- in stamps.

D.L. (Gordonvale): The portable set could not be made into an all-waver, because there are not suitable kits available. Even a dual-wave circuit would not be possible in the present layout. But you could use much the same circuit, and a dual-wave kit and get probably good results. The chassis would need to be modified in order to take the coils. Thanks for your nice remarks, and we regret we could not answer your question sooner.

S.B. (Ballarat): Unfortunately, we could not supply you with the details on making the pedal generator. We have never had occasion to build one ourselves.

"Old Reader" (Merriwagga): The failure to get good results at the top of the dial may be due to the coils not lining up at that point. Or it might be due to the coils not being up to the mark. Are you sure you have the padder properly adjusted? The interference is probably coming through the intermediate channel, and as such is very hard to remove. Make sure you have not materially altered the intermediate frequency when lining up the set—this could cause the Morse interference, or at least a good deal of it, and also make the lining of the set difficult.

A.F.B. (Tighe): Yes, if you connect a 3-plate midget across the oscillator section you should be able to obtain a degree of bandspread which will allow more accurate tuning of the converter. Don't carry this idea too far, or you will get the two tuned circuits so much out of line that results will suffer. There would be no need to run a condenser across the grid circuit of the valve, as this tunes fairly broadly, and the mistuning would not be enough to prevent you from receiving good signals from the various stations. This idea of a small trimmer on the oscillator may be applied to quite a number of sets with more or less success. But, as we say, the condenser should be a very small one, with quite a restricted tuning range. Otherwise, the misalignment of the set will offset the advantage gained.

R.A.C. (Wentworth): Thanks for your letter and the circuit. Yes, the 201a valve could be used in the oscillator, but you will, of course, need 6 volts for the filament. As the drain is .23 amps, this will mean an accumulator. Thus it is not the best valve to use. However, it would work, and that is what you wanted to know!

J.E.C. (Mt. Gambier): No, we do not propose to describe "Little Jim" or similar sets for D.C. current. There are so many snags to D.C. operation that we are not keen on running into them. Unless very carefully used, there is considerable danger with such circuits. Only constructors who know what they are doing should attempt them. And as a rule, they will not require any help from us. So far we haven't any fatalities to our credit, and we don't want to have any!

"A Learner" (Melbourne): Yes, there is nothing to prevent you from winding up metre coils at home. But in what set? It is hopeless to talk about 5 metre coil when we don't know what set you want them for. Also, at the moment there is nothing to be heard on 5 metres, so not much use in winding the coils. In "Radio and Hobbies" a few issues ago, we published details of a 5-metre converter which would give you an idea of what the coils would be like. But again, we can't make any useful comment without knowing what set you require them for.

C.W. (Renmark): We cannot give you any information on the building of a generator. This is a matter which would call for personal experience, if we were to give you any information worth while. As we have never tried out the idea, it would be only guessing to make any suggestions.

G.W.M. (North Queensland): The metal valves are only made in the A.C. types. Therefore, they would not be of much use to you if you want to replace battery types, as from your letter it is evident that you do. Even if the A.C. valves were used in an A.C. circuit, so many alterations would be required that it would be hopeless to try and tell you about them without the aid of sketches and diagrams. Also in many cases, we doubt whether they would be suitable.

B.C. (Devonport): We have been trying to find out something about the bows and arrow, but haven't enough information at the moment to say much about it. However, it has given us an idea, and we will see what we can do about an article on the subject. Have any readers ideas on this matter of archery? It should not be hard to find some way of making very effective bows and arrows for those keen enough to take the trouble.

T. McT. (Chatswood), writes: Just recently I made my first break into radio and constructed "Little Jim's Mate." I am very pleased with the results. The total cost was 35/7½. The majority of the parts were new, everything but the earphones being purchased. I work in a city electrical workshop and this helped as I got a slight cut on the more expensive parts. We are located a short distance from Fuller's Bridge which you may or may not know is fairly low in a valley. With a 2ft. aerial I find it possible to get 4 or 5 local stations loud enough to distort the phones. With a longer aerial, up to 10 or 12ft., I get more stations, but with a lot of lapping. One morning I got 2CA. This may not be out of the box, but we cannot get it on our larger set. To date, I haven't had the set away from home. However, I am looking forward to taking it away at Christmas to either outside of Woy Woy or out of Richmond. The set was tried with a loud speaker. It could be heard (one or two stations only), faintly up to 6ft. away. It was too much of a strain so I discarded the speaker and stuck to the phones.

A.: Many thanks for your letter and the report on the set. We could not say at the moment whether those back numbers are available, but if you send us 6d in stamps for each issue, we will send you either the issues or your money back. Petrol motors are used for planes because they develop such a high power for their weight. Electric motors would be nowhere near as powerful for the weight—have you ever seen an electric motor of 1-5th horsepower? It would be as heavy as a couple of hundred planes! No, the petrol motor has it all over any other type of power plant when it comes to the test.

W.L. (Rozelle): Sorry, we can't send circuits through the post. However, we have in mind an article some time soon, on Crystal Set Circuits. Maybe in that article you will find the circuit you want.

J.W.S. (Boonah): The set to which you refer sounds like the Duplex Single. The original article is now out of print, but we ran it again in a Call-sign Book of which we may still have a few copies. If you send us 1/- in stamps, we will let you have one, if they are still available. This issue contained all the original information as published about the receiver in the first place. Sorry we can't reply to letters by post.

G.H. (Byrock): It would be quite impossible for us to tell you where the stations would come on your dial which is marked 0-100. Many old sets were marked this way, but the dial markings were never the same on any two sets, except by chance, even of the same make. We fear that your only course is to log as many as you can, and estimate the positions of the others from your observations. At the bottom of the dial, there are quite a number of stations which share the same wavelength. Naturaly you can't separate these, nor could any other receiver capable of hearing more than one at once. So it is nothing to do with your valves. At the same time, the receiver you have is old, and, therefore, not very selective. It is only reasonable to expect that with your job it will be harder than with a more modern receiver.

H.D. (Kyogle Line): It is not always possible to get every station which is marked on the dial of a broadcast set! That would be a bit too much to expect. There are several reasons for this—radio sets may go into pretty well every part of Australia. As such, the dials must carry the stations which are likely to be heard in all these parts. So, although you may not be able to hear that station, in parts of Queensland, they may do it quite easily. The stations you have heard outside the dial markings sound as though they are amateurs. Before the war, some amateurs were allowed to broadcast on the broadcast band at the bottom end. These are often heard a good way from the city of origin.

L.H. (Earlwood): We suggest that you address your queries in a special letter to Mr. Alf Barnes, c/o "Radio and Hobbies." He will probably be able to answer your questions direct.